6113

Assessment Report

GREAT PLAINS DEVELOPMENT
COMPANY OF CANADA, LTD.

#6113

GEOLOGICAL, GEOPHYSICAL, GEOCHEMICAL AND DIAMOND DRILLING REPORT ON THE TAN, AX, SO, AND DANE CLAIMS, BRITISH COLUMBIA

NEW WESTMINSTER MINING DIVISION
N.T.S. 92H/4W

Latitude: 49 degrees, 01 minute
Longitude: 121 degrees, 47 minutes

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November, 1976

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA M. D. McINNIS

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A. SUMMARY

The 1976 field program on the Tan project was carried out between May 15 and August 31, 1976. The program was designed to define and delineate subsurface mineralization on the Fumarole Creek geochemical anomaly and in the Main Showing area. A pole-dipole array Induced Polarization survey and a Max-Min II Electromagnetic survey were carried out over the two areas. Soil profile sampling was used in the Fumarole Creek area to better define the characteristics of the soil geochemical anomaly and in the Main Showing area, trenching was used to better expose known mineralization. The results of the geophysical surveys led to the locating of two diamond drill hole sites, one in each of the areas, and a total of 486 feet of core was drilled.

In the Fumarole Creek area a series of altered flows and pyroclastics were interesected. The section appeared intensely fractured and carried moderate amounts of pyrtie. Economic mineralization was restricted to a narrow zone of brecciated amygdaloidal andesite flow in which weak veins of quartz, sphalerite and chalcopyrite were observed. It was concluded that the Fumarole Creek anomalies are due, at least in part to widespread moderate accumulations of copper and zinc mineralization. The drilling in the Main Showing area encountered a series of amygdaloidal andesitic flows enclosing a large altered, brecciated and locally silicified zone. This altered zone carries sphalerite and chalcopyrite with quartz in narrow veins. The mineralization encountered was not sufficient to represent ore grades but may represent a feeder in a volcanogenic system.

The program carried out on the Fumarole Creek and Main Showing areas served to define the mode and tenor of mineralization that was of prime interest in the objectives of the survey. It was observed that an irregular altered zone in the volcanic section, which might possibly indicate a feeder system for a massive sulphide deposit, carried sub-economic volumes of mineralization but no indications of the occurrence of a massive sulphide body or its possible location could be found.

Geological mapping was carried out on the southern slopes of Mount McGuire in an effort to define potential economic mineralization in that area. A geologic map at a scale of one inch to 400 feet was produced and a report by Malcolm Mawer, who carried out this mapping, is enclosed within this report. It was determined that some small shear-vein type mineralization carrying sphalerite and chalcopyrite was found and zones of silicification and brecciation were observed. Important mineralization was not observed but a detailed look at cut hand specimens is recommended to better define the occurrence of altered zones in this and other areas of the property.

As a result of the findings of the 1976 field program on the Tan claims, it is recommended that the Tan option agreement be held but that no further work be done on the property by Great Plains Development Company of Canada, Ltd., until such time that new significant data is available for appraisal. Such data might be in the form of new exposures of outcrop uncovered by roadbuilding during logging operations currently being undertaken in the area. It is suggested that further exploration on the property would entail deep hole diamond drilling in the area of Lihumitson Mountain to obtain additional geologic knowledge.

B. INTRODUCTION

1. History

One of the showings on the Tan property has been known since the early 1960's, but, as far as is known, no work had been performed on the property prior to 1972. The claims were staked by the present owners in the spring of 1972 after prospecting turned up several additional showings of zinc and copper mineralization. The owners carried out minor stripping and trenching on the Main Showing and the Pyrite Showing in early 1972.

Cominco secured an option on the property and carried out geological mapping and soil and stream silt geochemical sampling during the period August to November, 1972. In 1973 Cominco carried out an induced polarization survey and road construction during July to October. Cominco terminated the option agreement at the end of 1973.

The owners approached Great Plains in the spring of 1974 with the property and it was felt that the property had considerable merit as a volcanogenic type prospect. An option agreement was entered into in June, 1974.

During the 1975 field season, Great Plains Development Company of Canada, Ltd. carried out a program consisting of diamond drilling, soil and stream silt sampling, geological mapping and an orientation electromagnetic survey.

In 1976, Great Plains Development Company of Canada, Ltd. undertook a program consisting of geological mapping, soil profile testing, trenching, linecutting, induced polarization surveying, electromagnetic surveying, diamond drilling and road building and clearing.

2. Ownership

The Tan claim group, consisting of the TAN, AX, SO and DANE claims, are owned by M. McClaren, O'Bryne Road, R.R. #3, Sardis, British Columbia, G. Stapley, 23 Bell Acres Road, R.R. #3, Sardis, British Columbia and W. A. Bell, 975 Chilliwack Lake Road, R.R. #3, Sardis, British Columbia.

The property was optioned in June, 1974 from the owners by Great Plains Development Company of Canada Ltd.

The claim group consists of sixty-one contiguous claims, two fractional claims and one new claim consisting of nine units for a total of seventy-two claims. The pertinent data on these claims is as follows:

CLAIM	RECORD NO.	DUE DATE FOR ASSESSMENT
Tan 1-14, 17-30	25284-25295, 27521-27536	April 5, 1977
Tan 31-38	27623-30	April 17, 1977
Tan 39-44	27742-47	May 9, 1977
Tan 45-46	27748-49	May 18, 1977
Tan 47-48	27792-93	May 29, 1977
Tan 49, 50	27892-93	June 20, 1977
AX 1-6	28200-05	November 14, 1976
SO 1-9	28184-92	October 17, 1976
DANE 1 (9 units)		April 25, 1977

Assessment credit will be applied for on all claims to put them in good standing for an additional two years.

3. Location

The Tan claim group is located in Southwestern British Columbia, on Tamihi Creek adjacent to the U.S. - Canada International Boundary at the coordinates of 49 degrees 01 minute latitude and 121 degrees, 47 minutes longitude. The property is in N.T.S. 92-H-4 W and falls within the New Westminster Mining Division. Access is by a gravel logging road, 5 miles from the Chilliwack River road which is a paved road approximately 10 miles south from the town of Chilliwack and the Trans-Canada Highway. Chilliwack is located 67 miles by road east of Vancouver.

4. Economic Considerations

The Tan property is within fifteen road miles of major highway and rail connections leading to Vancouver, which is 67 miles further distant. The property is within five miles of power lines and ample water supplies can be found on the property. The topography is rugged with elevations ranging from 1,000 feet to 4,800 feet on the claim group. A small part of the property has been logged and the remainder is heavily timbered up to the 4,500 foot elevation where alpine vegetation takes over. The property is in an area of moderately high annual precipitation and experiences an annual snow fall of approximately three feet.

5. Previous Exploration

The following is a summary of all exploration work carried out on the Tan claim group prior to 1976.

1972: Minor trenching by the owners.
1972: Falconbridge - geological mapping and soil sampling prior to making an option decision.
1972: Cominco - soil and stream silt sampling and geological mapping.
1973: Cominco - induced polarization survey, road building and drill site preparation.
1975: Great Plains Development - geological mapping, geochemical surveys, electromagnetic survey, road building and diamond drilling.

6. Objectives

The 1976 field program on the Tan project was designed to test the priority areas of Fumarole Creek and the Main Showing for economic massive sulphide mineralization and to define the potential for similar mineralization on the southern slopes of Mount McGuire. To achieve this, geological mapping, soil profile studies, trenching, induced polarization and electromagnetic surveying and diamond drilling were utilized.

A geological model, defined in the 1975 Tan Yearend Report, was used as a premise for the 1976 program. This model defined a series of altered, brecciated and silicified tuffs which carry copper and zinc sulphides, visible in the Main Showing and interpolated in the Fumarole Creek area, and related this mineralization to a volcanogenic source. It was hoped that a massive sulphide body related to this system could be found by the methods described above.

C. EXPLORATION AND DEVELOPMENT

1. Geological Mapping: Mount McGuire

The following section is a report, by M. Mawer, on the Mount McGuire mapping project. The results of this mapping indicate zones of silicification and brecciation similar to the Main Showing area. A reinterpretation as to the mode of occurrence of these altered zones was made by the author, primarily from the results of the 1976 drilling program, after the following report was written. This reinterpretation was possible due to the fresh exposure in drill core of textures and relationships which had not previously been observed. This fact indicates that a more detailed look at cut hand specimens and perhaps thin section work in other areas of the property, including the Mount McGuire area, would be warranted in order to better define these altered zones. In reading the following report, it should be kept in mind that the altered zones of silicification and brecciation may be much more irregular than is observable in outcrop exposures, as was found in the Fumarole Creek area.

1. (a) Introduction

The lower reaches of Mount McGuire, north of Tamihi Creek were mapped at a scale of 1 inch = 400 feet with a view to locating and defining the extent of acid volcanics and any economically interesting mineralization therein.

Mapping and prospecting were carried out between May 30th and June 25th by four geologists, comprised at different times of Malcolm Mawer, Colin Winter, Tom Bojczyszyn and Doug Good. An effort was made to space traverses at less than 1,000 foot intervals with a view to achieving as complete ground coverage as possible in the time available. As no grid is present on this part of the property, topographic maps at 1 inch = 400 feet with 50 foot contour intervals were used as base maps, these being augmented by 1 inch = ½ mile aerial photos. Regularly spaced north-south trending streams and gullies which cut the property provided reasonable controls.

Overall outcrop exposure is less than 10%, although good exposures are present on cliffs and in gullies.

1. (b) Lithology

The lithology in the mapped area ranges from dacites of the lower volcanic series (unit 3) south of Tamihi Creek to amygdaloidal andesites of the upper volcanic series (unit 12) north of Tamihi Creek (see attached maps).

Unit 3, outcropping primarily to the south of Tamihi Creek, is made up of light green to grey rhyodacite containing millimetric feldspar phenocysts, frequent quartz eyes and occasional calcareous blebs. It is generally massive and grey weathering. It has been proposed that this unit represents a hypabyssal sill which intrudes tuffs and andesite flows of unit 4. A dyke of this composition and texture, three to six feet wide and trending at 15 degrees, was observed in the creek opposite Falls Creek on the north side of Tamihi Creek.

North of Tamihi Creek, the lowest outcropping unit is unit 4. This is a dark grey, fine-grained, poorly laminated rock of intermediate composition containing numerous cogenetic centimetric lapilli. Subsequent to its deposition, the rock was fractured and silicified and it presently contains numerous randomly oriented white quartz veinlets.

Above this is a 150 foot covered vertical interval which is superceded by a 5 foot band of light grey poorly banded chert, probably a silicified ash fall tuff, overlain by fine-grained acid ash fall tuffs and acid volcanic breccia. These are included as part of unit 4. The tuffs are hard, light green-grey rocks and containing numerous small cherty fragments. They are directly overlain by a hard, light grey to pink acidic lithic tuff band 20 feet thick containing interbeds of intermediate tuff. The lithic tuff is comprised of rounded varicolored centimetric fragments of chert, quartz and dacite in a fine-grained dacitic matrix while the interbeds are soft, fine-grained, grey rocks containing rounded cogenetic fragments up to 3 millimeters in size.

Calcarenite and limestone of unit 8 unconformably overlies unit 4 with no evidence of faulting at the single location where the contact was observed. The carbonate unit contains a fusilinid belonging to the genus Parafusulina which was dated by Dr. W. R. Danner of the Uniiversity of British Columbia as being of middle Permian age. The living environment of this genus was shallow water (less than 100 feet) and subtropical climate. Lithologically, as observed on the West Half map sheet north of Tamihi Creek, the unit grades from a fine to medium grained, thick bedded, recrystallized limestone to the west; to a light grey, fine-grained, medium bedded calcarenite to the east. The carbonate does not outcrop north of Tamihi Creek on the East Half map sheet. The lateral variation in the unit implies shallowing to the east prior to deformation.

Overlying the carbonate unit is a thick, repetitive sequence of units 9 and 11. Unit 9 is a soft (hard when silicified) red, or red and green mottled unit made up of andesite flows and volcanic breccias. While generally massive, it is frequently extensively sheared and is the least competent unit in the upper series.

Feldspars, where visible, appear somewhat saussuritized in the western part of the mapped area. Millimetric calcite and chlorite filled amygdules are common as well as euhedral millimetric chlorite pseudomorphs after hornblende. Epidote is locally present as thin veinlets.

The breccias characteristically consist of purple fragments set in a green, fine-grained chloritic matrix, while the flows are characteristically dark red or red and green mottled, often with thin red hematite veinlets outlining large rounded fragments.

Rocks of this unit are commonly extensively fractured and jointed with infrequent white quartz veinlets to 3 millimeters where silicification has occurred. These rocks have been shown to be subaqueous pyroclastic flows formed by sloughing of debris from the flanks of active submarine volcanoes during and after eruption.

Unit 11, overlying unit 9, both conformably and above shear planes comprises the following lithologies: (a) Silicified waterlain tuffs; (b) intermediate tuffs and (c) lithic tuffs.

The waterlain silicified tuffs are aphanitic to fine-grained, hard, light green to grey rocks. Silicification is evident to a greater or lesser extent and, in areas of intense silicification and replacement, appear cherty. They are frequently brecciated and cemented by thin black quartz veinlets. Apart from local pyritization, these rocks are essentially unmineralized. Foliation is usually visible either as a conspicuous parting, or as color banding.

Because of varying intensities of silicification, the cherty ash tuffs are not present in all bands of unit 11, nor do they occupy the same position in those bands in which they do occur.

The intermediate tuffs are very fine grained to medium grained soft (unless silicified) rocks consisting essentially of plagioclase and chloritized hornblende. Occasional curved chloritic fragments are present which may represent devitrified glass shards. In addition, irregular chlorite clots and pseudomorphs after hornblende, scattered quartz eyes, quartz and/or calcite blebs and thin hematite veinlets are present. Color varies from dark green to medium green-grey.

The lithic tuffs comprise millimetric to centimetric angular cherty and andesitic fragments set in a fine to medium grained grey matrix of intermediate composition.

The top unit of the upper series volcanics is unit 12 which is comprised of green, aphanitic to medium grained andesite flows that almost invariably contain calcite and/or chlorite filled amygdules. These amygdules are frequently stretched out in the direction of apparent flow and occasionally exceed 2 millimeters in length. Quartz eyes are not uncommon and the rock is often fractured and filled with white ruggy quartz veinlets up to 5 centimenters wide. Hematite and specularite grains are common and the rock may be lightly pyritized.

I. (c) Metamorphism

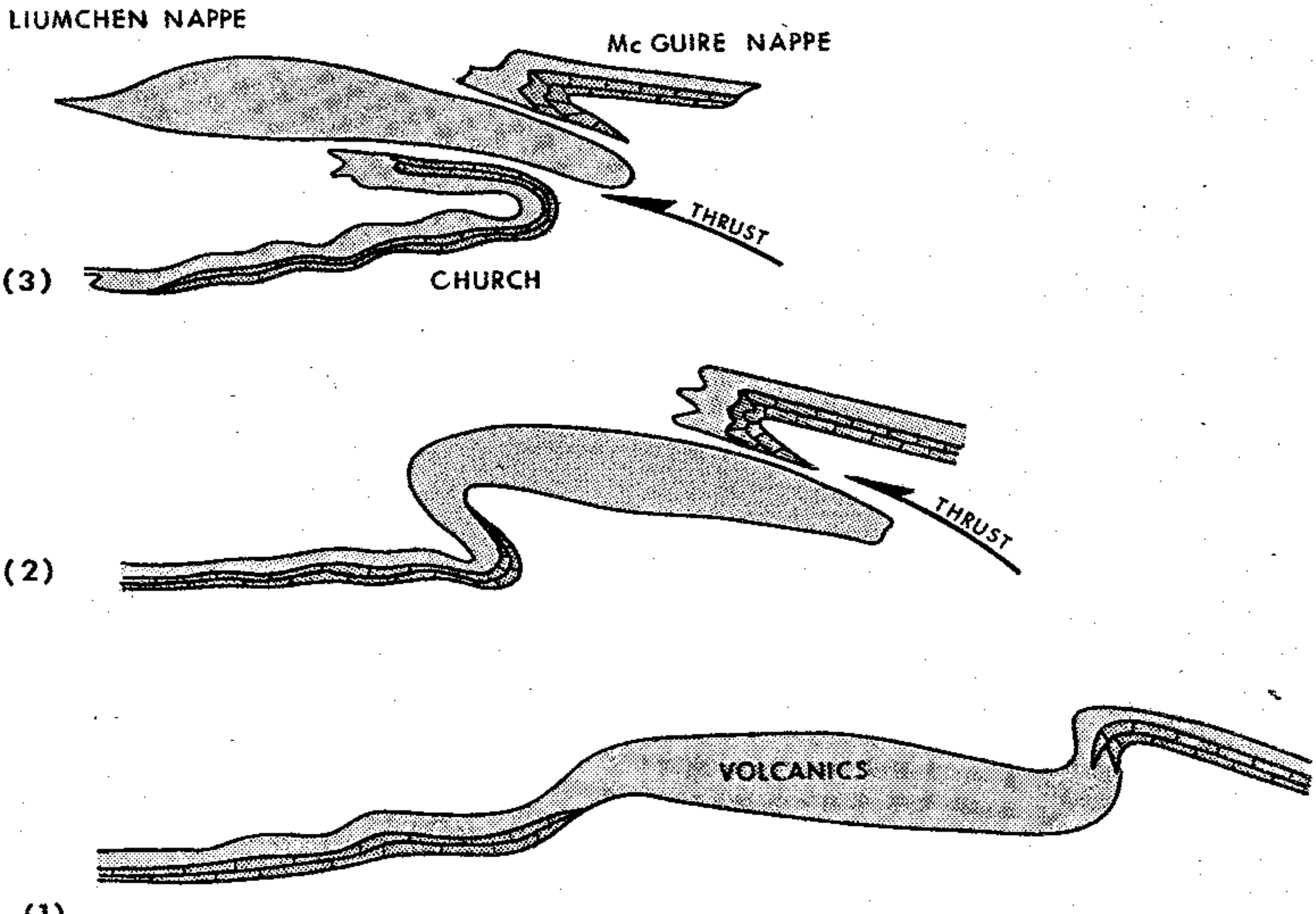
The Chilliwack Group has been involved in at least two episodes of deformation. The rocks belong to the lowest part of the greenschist facies. Feldspars in volcanic rocks are saussuritized, chlorite is ubiquitous and pumpellyite is present locally. Some feldspars in the dacite tuffs are altered to fine grained lawsonite, a mineral that characterizes the glaucophane schist facies (blueschist metamorphism). It has not been possible to relate this metamorphism to any period of deformation and it is suggested that this metamorphism is related to a short lived event such as rapid burial in a low geothermal environment followed by rapid uplift or by high pore pressures during overthrusting.

I. (d) Structural Geology

Regional deformation of the Chilliwack Group took place primarily during Mid-Cretaceous time. Paleozoic and Mesozoic rocks were intially deformed into northeast trending folds. As deformation continued, the northeast trending folds become overturned to the northwest, thrusting took place, and the Liumchen Nappe and the Mount McGuire Nappe were formed. Rocks of the McGuire Nappe were initially thrust over the Liumchen Nappe and became a recumbent anticline whose lower limb was partly removed by thrust faulting. With continuing deformation, the greater competancy of the thick volcanic sequence of the Liumchen Nappe resulted in this underlying Nappe being removed relatively further resulting in a drag fold (see diagram).

Minor structures indicative of the regional structural imprint are most notably visible in the north and northwest end of the property.

Diagram 1



— After Monger (1965)

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

BRITISH COLUMBIA

TAN CLAIMS

Regional Tectonic History

North of Tamihi Creek, the structure is more complex than had been previously indicated. It is characterized by northeast trending major and minor drag folds and numerous north to northeast trending shear zones.

The repetitions of lithologic sequence observed in the mapped area are the result either of a repetitive series of volcanic events or of imbricate thrusting parallel to the major thrust in the valley of Tamihi Creek. Based on the close similarity between consecutive series in the repetitive sequence, and on the large number of shears observed, particularly within unit 9, the latter probability is preferred by the author.

Strikes of the rocks are variable from northeast to northwest and back to northeast across the map area reflecting the folding. Dips vary from shallow to locally steep, generally to the northeast or northwest. One high traverse on the East Half map sheet encountered shallow to steep southerly dips raising the possibility of an earlier phase of folding than the north to northeasterly trending folds observed elsewhere.

I (e) Alteration

Alteration observed in the mapped area is of the following types:

(a) Silificication

Pervasive silicification is present, particularly within the ash fall tuffs of unit II and varies in intensity up to complete silicification and replacement of the tuffs such that the tuffs appear cherty. The extensively silicified rocks are frequently fractured and filled with thin black veinlets, generally less than 5 millimeters wide of quartz plus, probably, some organic material. In some cases, this 'black quartz' forms irregular patches in the chert breccia as well as fracture fillings. Silicification of the tuffs may have occurred during their deposition, resulting in their selective replacement, or as a consequence of silicic fluids percolating through the numerous shear zones present in the area.

Varying intensities of silicification also often affect the red andesites of unit 9 and the ash fall tuffs of unit 4.

(b) Chloritization

Chloritization of mafic minerals, lithic fragments, and possibly of glass shards, is widespread in the intermediate tuffs of unit II. Euhedral and broken chlorite pseudomorphs after hornblende are often found, both in the tuffs and in the overlying andesites of unit I2, in addition to irregular chlorite clots. Chlorite and/or calcite filled amygdules are also common in units 9 and I2.

(c) Pyritization

Pyrite is limited to the southeastern half of the map area within unit 11 and, to a lesser extent, within unit 12. The pyrite occurs as fine disseminations and as fracture fillings with quartz in silicified tuffs. In one location where the rocks have oxidized to a rusty color, the disseminated pyrite locally constitutes 20% of the volume of the rock (TB1 - TB6) but generally accounts for only one or two percent.

(d) Sulphide Mineralization

Sulphide mineralization appeared to be limited to units 11 and 12 in the southeastern part of the mapped area and was determined to be generally of very weak intensity. Pyrite was the only sulphide observed in any significant concentration. While the pyrite is generally very minor ($<0.1\%$ by volume), in several localities (see below), five percent pyrite by volume was observed in rusty, sometimes spongy and crumbly rock consisting of silica, tuffaceous fragments and pyrite.

The most interesting showing located during this mapping program was discovered in a creek bed approximately 900 feet above Tamihi Creek at an elevation of 2,200 feet and opposite Falls Creek. This showing consists of a shear zone trending approximately 15 degrees, which is traceable for about 400 feet horizontally. Two minor occurrences of chalcopyrite, sphalerite and pyrite in narrow quartz veins paralleling the shear direction were observed. One of these veins could be traced over six feet. The host rock appears to be a siliceous breccia locally containing zones of the black quartz alteration. The zone carries less than one percent disseminated pyrite. Sample DG-1 from this zone returned values of 2160 ppm copper, greater than 4000 ppm zinc and 5.2 ppm silver.

Above this zone, in the same creek, and at an elevation of approximately 2,750 feet, a large bluff outcrop shows a gossanous surface of about fifty feet by six feet. The outcrop appears to be relatively unaltered green amygdaloidal flow material and contains generally less than one percent pyrite, although local accumulations may reach two or three percent. No economic sulphides were observed.

At the 2,870 foot elevation in this same creek, a large outcrop appears to show a continuation of the above gossan. Pyrite occurs as disseminations and locally as narrow veinlets and the rock shows considerable leaching making an interpretation of the rock type difficult. A considerable amount of the gossanous effect of the outcrop is due to iron-rich groundwater coming out of joints and fractures and coating the outcrop surface. The rock appears to be feldspathic but locally, silicic, cherty specimens were noted. It was not possible to discern the relationships involved in the occurrence of this material. Again, no economic sulphides were observed.

Weak sulphide mineralization consisting of up to 2% pyrite with less than 0.1% chalcopyrite in silicified tuffs underlying barren cherty rock was observed at a point approximately 2,000 feet east of the above described gully. This weak sulphide mineralization occurs in a zone which extends for a strike length of about fifty feet and the greatest pyrite concentrations are in the ten feet below the chert breccia contact.

The lack of continuity, low concentrations, and small areal extent of the sulphide mineralization encountered in these showings indicates a low potential for economic sulphide mineralization. However, in view of the possible similarities of these showings to those at the Main Showing, further winter work in the form of rock slabbing and thin-sectioning should be carried out to increase our understanding of the area.

I. (f) Geochemistry

i. Soil Geochemistry Follow-up

An attempt was made to evaluate anomalies indicated by soil sampling carried out in previous years by Cominco. On the north side of Tamihi Creek, the largest combined copper-zinc anomaly was found to coincide with a weak sphalerite-chalcopyrite showing (described above - sample DG I).

South of Tamihi Creek, the very limited outcrop exposure (less than 5%) minimized the effectiveness of geological follow-up and no sulphide mineralization was observed to account for the anomalies.

ii. Rock Geochemistry

The following samples were subjected to geochemical analysis.

DG I This sample, returning values of 2160 ppm copper, greater than 4000 ppm zinc and 5.2 ppm silver, is from a sphalente, chalcopyrite showing in a siliceous shear zone. It coincides with the largest copper-zinc anomaly north of Tamihi Creek.

DG 4 This sample, returning values of 521 ppm copper, greater than 4000 ppm zinc and 0.5 ppm silver is taken from a small sphalerite-chalcopyrite showing 300 feet higher in the same gully and is related to the same shear zone as DG I.

TB I, TB 5 These samples, containing about five percent pyrite but no visible copper or zinc mineralization, were obtained from pyritized, silicified tuff of unit II underlying siliceous breccia. They returned values of 14 ppm copper, 39 ppm zinc and 1600 ppm copper, 77 ppm zinc, respectively.

76M51 This sample, returning values of 20 ppm copper, 6 ppm lead 43 ppm zinc and 0.8 ppm silver, was taken from chert breccia of unit II. No sulphide mineralization was observed, but the sample may be indicative of background metal values.

76M74 This sample, returning values of 76 ppm copper and 50 ppm zinc was taken from the rhyodacite sill south of Tamihi Creek. Very minor malachite was visible.

76M86, 76M87 These samples, returning values of 2710 ppm copper, 43 ppm zinc and < 4000 ppm copper, 70 ppm zinc, were taken from a calcite-malachite-chalcopyrite pod in shattered andesite of unit 12 at 3760 feet on the north side of Tamihi Creek. The pod was no more than five feet in diameter and is considered to have no economic significance.

1. (g) Conclusions

1. The mapping and prospecting effected on the north and south sides of Tamihi Creek seem to confirm the results of the soil geochemistry previously undertaken here in that only a few minor occurrences of sulphides other than pyrite were observed, and all of these were of low grade and small extent.

2. No significant sulphide mineralization was uncovered associated with the rhyodacite sill south of Tamihi Creek.

3. The potential for finding an economic sulphide ore body on the north side of Tamihi Creek appears to be low, while on the south side, poor outcrop exposure makes evaluation of soil geochemistry impractical without the aid of geophysics or drilling. The weak copper-zinc mineralization encountered while drilling the rhyodacite sill at the southeast corner of the property in 1975 does not justify further drilling.

2. Linecutting

From June 1 to June 7 four men were employed to compass, cut and chain 15.7 miles of lines and base lines comprising the Fumarole Creek and Main Showing grids. The lines were marked by pickets at 100 foot intervals using a topofil chain as a measuring device. The lines were spaced 200 feet apart and twenty-eight lines were cut on the Fumarole grid and four lines on the Main Show grid. In addition to this, base lines were cut on both grids and on the Fumarole grid, a tie line was put in at 14W between lines 0 and 40S, and at 20W between lines 40S and 56S. The lines on the Fumarole grid were put in at a bearing of 275 degrees and the Main Showing grid lines are oriented at 185 degrees.

3. Trenching: Main Showing Area

From June 21 to June 29 a blaster and a helper were employed to blast trenches in the Main Showing area. Four trenches were blasted to better expose the known mineralization of the Main Showing. Diagram 1 shows the locations of the trenches with respect to the grid and logging road. Trench C did not blast well and was never successfully completed. Diagrams 2 and 3 show the sample locations and lengths for trenches A and D. Hand speciment locations are shown on Diagram 1. An outcrop located approximately fifty feet west of Line 2E + 00 was also blasted in order to gain better exposure of the mineralization. Approximately 65 feet of trenching was carried out and all the trenches were filled in during subsequent road building by a local logging company.

Sampling and mapping of the trenches gave an idea of the tenor of the mineralization and when combined with the data received from the drill hole 76-2, a good idea of the geological environment was achieved.

The geologic section exposed by trenching was initially interpreted as a series of brecciated altered and silicified tuffs. It seems apparent now that these "tuffs" were originally flow material which were brecciated, mineralized and silicified and then deformed by regional tectonic forces.

The "mineralized horizon" can be generally defined as a zone of brecciation, silicification and hydrothermal alteration carrying sub-economic mineralization in the form of chalcopyrite and sphalerite in quartz veins. The precise stratigraphic location of this "horizon" is unknown due to the apparent irregularity of the altered zone although it can be placed high in the known section of the property and it correlates approximately with the contact area between the lithic waterlain tuffs and upper series amygdaloidal andesite flows. A more detailed description of the geology and mineralization observed in the trenches is given in section D.

Results of the trench sampling are listed on Page 15 in Table 1.

TABLE I

Trench	Sample No.	Sample Interval	Copper	Zinc
A	76-G-11	1.0 feet	0.07%	0.47%
A	76-G-12	1.0 feet	0.01	0.01
A	76-G-13	2.0 feet	0.01	0.01
A	76-G-14	0.5 feet	0.02	0.01
D	76-G-15	grab	1.98	4.26
D	76-G-16	grab	0.01	0.02
D	76-G-17	4.0 feet	0.01	0.04
D	76-G-18	2.0 feet	0.01	0.05
D	76-G-19	4.0 feet	0.01	0.02
D	76-G-20	0.5 feet	22 ppm	164 ppm
D	76-G-21	2.0 feet	30	248
D	76-G-22	1.0 feet	58	189
D	76-G-23	1.0 feet	100	305
D	76-G-24	4.0 feet	51	400

4. Soil Profile Testing - Fumerole Creek Area

Twenty-eight soil profiles were dug and sampled on lines 32S, 36S, 38S, 40S, 42S and 44S. The profile pits were from three to five feet in vertical depth and samples were generally taken at one foot intervals from the top of the B horizon. Table 2 lists the samples, their location, depth and corresponding copper and zinc values. It can be seen that with the exception of one sample, on line 42S, all the profile results for both copper and zinc either increase with depth or remain relatively stable with depth. The sample at station 5W on line 42S shows decreasing zinc values and slightly increasing copper values with depth. The soil profile survey confirms that the soil geochemical anomaly on the Fumarole Creek grid relates to subcropping rock and that movement of the anomaly, either down-slope or down-valley, is minimal.

TABLE 2

Line	Station	Sample No.	Depth From Surface	Copper (ppm)	Zinc (ppm
32S	2E	76-B-244	0.5 feet	209	1000
32S	2E	76-B-245	1.5 feet	248	1000
32S	2E	76-B-246	2.5 feet	152	800
32S	B.L.	76-B-247	0.5 feet	131	780
32S	B.L.	76-B-248	1.5 feet	160	1200
32S	B.L.	76-B-249	2.5 feet	309	1840
32S	2W	76-B-250	1.0 feet	98	640
32S	2W	76-B-251	1.5 feet	82	560
32S	2W	76-B-252	2.5 feet	66	500
36S	2W	76-B-210	0.5 feet	350	760
36S	2W	76-B-211	1.5 feet	434	920
36S	2W	76-B-212	3.0 feet	434	1000
36S	4W	76-B-213	0.5 feet	450	880
36S	4W	76-B-214	1.5 feet	656	1280
36S	4W	76-B-215	2.5 feet	640	1240
36S	6W	76-B-220	0.5 feet	33	233
36S	6W	76-B-216	2.0 feet	36	240
36S	6W	76-B-217	2.5 feet	58	344
36S	6W	76-B-218	3.5 feet	76	420
36S	6W	76-B-219	4.5 feet	76	450
36S	8W	76-G-226	0.25 feet	20	140
36S	8W	76-G-227	1.0 feet	40	248
36S	8W	76-G-228	2.0 feet	54	240
36S	8W	76-G-229	3.5 feet	66	265
36S	10W	76-G-222	0.25 feet	14	105
36S	10W	76-G-223	1.0 feet	52	344
36S	10W	76-G-224	2.0 feet	72	375
36S	10W	76-G-225	3.0 feet	64	360
38S	B.L.	76-G-200	0.25 feet	33	194
38S	B.L.	76-G-201	1.0 feet	58	400
38S	B.L.	76-G-202	3.0 feet	74	480

TABLE 2 - continued

Line	Station	Sample No.	Depth From Surface	Copper (ppm)	Zinc (ppm)
38S	2W	76-G-203	0.25 feet	76	330
38S	2W	76-G-204	1.0 feet	92	500
38S	2W	76-G-205	2.0 feet	72	381
38S	2W	76-G-206	3.0 feet	94	500
38S	4W	76-G-207	0.25 feet	170	680
38S	4W	76-G-208	1.5 feet	186	780
38S	4W	76-G-209	3.0 feet	165	720
38S	6W	76-G-210	0.25 feet	54	305
38S	6W	76-G-211	1.0 feet	46	265
38S	6W	76-G-212	2.5 feet	28	155
38S	6W	76-G-213	3.5 feet	38	206
38S	8W	76-G-214	0.25 feet	41	285
38S	8W	76-G-215	1.0 feet	56	375
38S	8W	76-G-216	2.0 feet	60	295
38S	8W	76-G-217	3.0 feet	76	295
38S	10W	76-G-218	0.25 feet	24	86
38S	10W	76-G-219	1.0 feet	22	140
38S	10W	76-G-220	2.0 feet	33	184
38S	10W	76-G-221	3.0 feet	42	225
40S	2 + 10W	76-B-230	0.5 feet	186	265
40S	2 + 10W	76-B-231	1.5 feet	323	392
40S	2 + 10W	76-B-232	2.5 feet	189	240
40S	4W	76-B-227	0.5 feet	170	1040
40S	4W	76-B-228	1.5 feet	197	1760
40S	4W	76-B-229	2.5 feet	165	1400
40S	6 + 30W	76-B-221	0.5 feet	84	540
40S	6 + 30W	76-B-222	1.5 feet	108	620
40S	6 + 30W	76-B-223	2.5 feet	98	500
40S	8W	76-G-162	1.0 feet	33	344
40S	8W	76-G-163	1.5 feet	52	344
40S	8W	76-G-164	2.5 feet	63	285
40S	8W	76-G-165	3.5 feet	191	450
40S	8W	76-G-166	4.5 feet	215	392

TABLE 2 - continued

Line	Station	Sample No.	Depth From Surface	Copper (ppm)	Zinc (ppm)
40S	10W	76-G-157	0.5 feet	41	194
40S	10W	76-G-158	1.5 feet	38	164
40S	10W	76-G-159	2.5 feet	42	206
40S	10W	76-G-160	3.5 feet	82	400
40S	10W	76-G-161	4.5 feet	86	317
42S	2W	76-B-233	0.5 feet	154	880
42S	2W	76-B-234	1.5 feet	136	920
42S	2W	76-B-235	2.5 feet	128	880
42S	2W	76-B-236	3.5 feet	134	960
42S	5 + 25W	76-B-224	0.5 feet	33	1720
42S	5 + 25W	76-B-225	1.5 feet	175	720
42S	5 + 25W	76-B-226	2.5 feet	175	700
44S	2 + 60E	76-B-240	0.5 feet	84	344
44S	2 + 60E	76-B-241	1.5 feet	92	400
44S	2 + 60E	76-B-242	2.5 feet	163	580
44S	2 + 60E	76-B-243	3.5 feet	165	560
44S	B.L.	76-B-237	0.5 feet	66	375
44S	B.L.	76-B-238	1.5 feet	128	960
44S	B.L.	76-B-239	2.5 feet	116	720
44S	2W	76-G-132	0.5 feet	124	400
44S	2W	76-G-133	1.5 feet	74	275
44S	2W	76-G-134	2.5 feet	54	169
44S	2W	76-G-135	3.5 feet	98	392
44S	2W	76-G-136	4.5 feet	131	500
44S	4W	76-G-137	1.0 feet	33	115
44S	4W	76-G-138	2.0 feet	38	218
44S	4W	76-G-139	3.0 feet	80	184
44S	4W	76-G-140	4.0 feet	84	179
44S	4W	76-G-141	5.0 feet	118	169
44S	6W	76-G-142	1.0 feet	46	123
44S	6W	76-G-143	2.0 feet	50	160
44S	6W	76-G-144	3.0 feet	122	392
44S	6W	76-G-145	4.0 feet	333	1120
44S	6W	76-G-146	5.0 feet	355	1160

TABLE 2 - continued

Line	Station	Sample No.	Depth From Surface	Copper (ppm)	Zinc (ppm)
44S	8W	76-G-147	0.5 feet	68	285
44S	8W	76-G-148	1.5 feet	82	275
44S	8W	76-G-149	2.5 feet	88	285
44S	8W	76-G-150	3.5 feet	100	211
44S	8W	76-G-151	4.5 feet	90	233
44S	10W	76-G-152	1.5 feet	41	255
44S	10W	76-G-153	2.5 feet	62	392
44S	10W	76-G-154	3.5 feet	118	580
44S	10W	76-G-155	4.5 feet	126	640
44S	10W	76-G-156	5.0 feet	108	500

5. Geophysical Surveys

(a) Induced Polarization Survey

An induced polarization survey using a pole-dipole array with a Scintrex was carried out by John Lloyd, contracting geophysicist, of Vancouver. Approximately 5.1 line miles were surveyed on the Fumarole Creek grid and 0.74 line miles on the Main Showing grid. The survey was carried out from June 7 to June 25 with a crew of six men. The survey was used to attempt to delineate mineralization in the area of a large soil geochemical anomaly. The survey outlined two target areas on the Fumarole grid and one on the Main Showing grid, although no indications of massive sulphide mineralization were found. Two drill sites were located on the basis of this survey. The details and results of the survey are outlined in a report by John Lloyd which is included in Appendix III.

(b) Electromagnetic Survey

John Betz of Toronto was contracted to carry out a Max-Min II electromagnetic survey on the Tan property. Approximately 5.2 line miles on the Fumarole grid and 0.59 line miles on the Main Showing grid were carried out by a four-man crew. The survey began on June 24 and was completed on July 13, 1976. The survey indicated serveral long narrow bands of poorly conductive subsurface material in both areas but failed to outline any zones giving a characteristic massive sulphide response. The results of the Max-Min II survey were vague and were only generally used to determine drill targets. Full details and results of the electromagnetic survey are given in a report by J. E. Betz included in Appendix III of this report.

6. Drilling

Tonto Drilling of Vancouver was contracted to drill two holes for a total of 486 feet. A BBS-1 wireline drill was employed and the drilling commenced on July 14 and was completed on July 31, 1976.

Diamond drill hole 76-1 was collared on line 38S + 11W on the Fumarole grid to test an induced polarization anomaly as well as the soil geochemical anomaly. A proposed depth of 700 feet was not reached due to bad caving problems and the hole, drilled with BQ core, was stopped at 248 feet. The hole was drilled parallel to the grid line with a bearing of 95 degrees and a dip of minus 80 degrees southeast. The hole hit bedrock at 35 feet and cut through a section consisting of amygdaloidal andesite flow, siliceous fragmentals and altered zones of presumably volcanic material. Copper and zinc mineralization was encountered at 111 feet. A one foot section of brecciated amygdaloidal andesite flow, healed by black, thin quartz veins, carries minor amounts of chalcopyrite and sphalerite.

Alteration in this section consists of silicification, including quartz veining and pervasive silicic alteration; the alteration of feldspars by kaolinitization and saussuritization; and minor talc alteration along fracture planes.

The section is highly fractured with fracture planes varying in orientation but with a predominant fracture angle of 80 degrees to 90 degrees from the core wall (near horizontal). Brecciation was observed throughout the hole but was found to be restricted to short sections and is commonly associated with silicification.

Pyritization is generally weak above 80 feet and is consistently moderate below this level, with 0.5 to 2.0% pyrite being found as disseminations and, locally, as narrow veinlets. The "mineralized horizon" or "altered zone" that confines the Main Showing mineralization, was observed at 73 to 74 feet; 81 to 110 feet and 229 to 248 feet. The black quartz veining, which is most characteristic of this altered zone, was found to occur throughout the hole with the exception of the amygdaloidal andesite at the top of the section. A core sample taken at 111.5 feet over four inches returned an assay of 0.5% zinc and 0.17% copper. All other samples in hole 76-1 returned low assays. Sample assays and a more detailed description of the lithologies can be found in the drill logs in Appendix II and I, respectively.

Diamond drill hole 76-2 was collored 25 feet east of L4E + 1 + 75S on the Main Showing grid. The hole was located near the centre of an induced polarization chargeability anomaly and directly above the Main Showing. Hole 76-2 was drilled vertically to 238 feet which was short of the proposed 300 foot length and NQ core was recovered. It is felt that the hole successfully accounts for the induced polarization anomaly.

Hole 76-2 cuts a section of amygdaloidal andesite flow which encloses a zone of altered, locally silicified and brecciated material noted as the mineralized horizon. From the top of the hole, altered flow material can be seen to grade into the altered zone where primary textures are non-existent. This gradation or transition zone involves an increase in the black quartz vein alteration from one or two pervading veins per foot to a continuous section of black quartz-feldspar-calcite material which constitutes the altered or mineralized horizon and this transition can be observed in the section from five to forty-seven feet. From forty-seven to fifty-seven feet, a zone of grey, fine grained quartz-feldspar rich rock was observed. From fifty-seven to 122 feet, the "core" of the 'mineralized horizon' or 'altered zone' was crossed. This zone consists of a fragmental with black angular 2 mm to 5 mm black fragments and 2 mm to 2 cm grey siliceous fragments which are cut by black veinlets. These fragments are set in a fine grained matrix which appears to consist of quartz and feldspar. Quartz-calcite veinlets cut the core at angles between 30 degrees and 50 degrees at a frequency of two per foot from 90 feet. This section contains approximately 1% pyrite as coarse to fine, subhedral to anhedral grains in the matrix in the form of narrow veins and accumulations associated with quartz and quartz-calcite. This altered, brecciated section appears to be more siliceous from 110 feet and the light grey siliceous fragments predominate. Chalcopyrite, sphalerite and pyrite with quartz and calcite occur as narrow veins at 59, 104, 108, 118, 121 and 122 feet. Chloritic slickensides at 45 degrees to the core wall were noted throughout this section.

From 122 to 139 feet a transition zone between the altered zone and the amygdaloidal andesite flow was cut. This zone equates to the zone described at the top of this hole and these two zones describe an alteration aureole above and below the altered horizon. This zone is best described as an alternating sequence of altered flow, cut by black veining and black mottled alteration and siliceous, locally brecciated, grey to black altered material which is presumed to be, in part, altered flow and, in part, intruded siliceous material. The quartz-calcite veinlets prevail through this section as they did in the latter part of the mineralized horizon. Chlorite filled amygdules are present in the transition zone but are not prolific in their abundance.

Below the transition zone, to the bottom of the hole, lies an amygdaloidal andesite flow. It is locally brecciated and cut by black quartz veining. Quartz-calcite veins amount to three or four per foot. A brecciated and silicified zone occurs at 219 to 225 feet and contains a six inch quartz-calcite-chalcopyrite-sphalerite-pyrite vein. The flow contains trace to minor amounts of pyrite and is characterized by two to five millimeter chlorite filled, (rarely with a calcite core) amygdules set in a fine to medium grained feldspathic matrix. Minor epidote was noted in a quartz-calcite vein.

Select samples from the core, over short intervals, returned assays of 0.01 to 0.43 percent copper and 0.02 to 7.68 percent zinc.

A more detailed account of the core and assays pertaining to it can be found in the core logs and assays in Appendices I and II.

D. GEOLOGY

I. Discussion of Results: Mineralized Horizon

The southeast facing slope of Fumarole Creek, in the area of the soil geochemical anomaly, is plagued with a lack of outcrop exposure. Geological interpretation has, therefore, been limited to interpolation across the area of the geochemical anomaly. Diamond drill hole 76-1 was collared at station 11W on line 38S on the Fumarole grid to test in induced polarization and soil geochemical anomaly, and this hole added significant geological data to this previously geologically unknown area.

The Fumarole area was thought to be underlain by a series of altered and silicified tuffs with shallow dips into the hill, overlain by an amygdaloidal andesite flow. Hole 76-1 shows that the section consists of a greater variety of flows and fragmentals than was expected. More importantly, what has been called the cherty, brecciated tuff, or silicified tuff, now appears to be an altered and silicified zone which is distinguishable as a mapable unit but is not necessarily an altered tuff. In hole 76-2, in the Main Showing area, the altered zone is enclosed within a series of amygdaloidal flows which are overlain by lithic tuffs. Hole 76-1 shows a greater variety of lithologies but the style of the altered zone is the same as at the Main Showing. The geological data acquired by diamond drilling has shown that the alteration by invading siliceous fluids which carried varying amounts of copper and zinc mineralization has not been restricted to a particular set of tuffs or other lithologies. It is still believed that the zone is concentrated high in the geologic section on the property although its shape and the grade of alteration is variable and irregular, generally conforming to bedding but not restricted by it. There does, however, appear to be a weak correlation between the mineralized horizon and the top of the amydaloidal flows near their contact with the tuffs.

The mineralized horizon is characterized by a very fine grained quartz-feldspar rich, in places cherty, rock carrying pervasive, randomly oriented, irregular veinlets of quartz which are blackened by undetermined impurities. The rock varies from a light grey or green color to black and normally carries one to two percent pyrite in subhedral to euhedral disseminated form. Narrow pyrite veinlets in zones of brecciation are also common. The horizon is locally intensely brecciated indicating that pervasive silicification and minor pyritization preceded brecciation, healing by siliceous fluids (including the introduction of the black quartz veinlets) and pyritization. The introduction of economic sulphides is related to the latter event as well.

In the Main Showing area it was noted that tectonic deformation, by folding and thrusting, followed the above events and locally caused minor crenulations in pyrite veinlets and brecciation of sulphide material with possible minor sulphide remobilization. The overall effects of this regional deformation on the style and mode of the mineralized horizon appear to be minimal other than obliterating the structural continuity of the horizon, which would appear to have existed in an undeformed section.

In the Main Showing area, fragments of altered flow can be observed locally within the mineralized horizon. These fragments show a medium grained texture containing anhedral feldspar phenocrysts and flat streaks of chlorite, apparently remnant of either mafic material in the flow and/or amygdules which are commonly filled with chlorite and/or calcite in relatively unaltered flow material. These fragments stand out against a background of fine grained siliceous black material which makes up the altered horizon. Thin section work is needed to get better definition of the composition and texture of this horizon.

Copper and zinc mineralization occurs in the form of discontinuous veins within the mineralized horizon at the Main Showing. Sphalerite and chalcopyrite and minor pyrite comprise the vein sulphides which vary from 1/8 inch to 1/2 inch in width and are traceable over a few feet in individual vein length. The strike length of the zone containing this mineralization appears to be in the order of two to three hundred feet although it has not been traced continuously over this length due to a lack of outcrop exposure. This mineralized horizon is known to extend into hillside where it has been intersected by diamond drill hole 76-2. This intersection gives the zone a minimum "dip" extent of approximately 150 feet and an apparent thickness of approximately 90 feet. Similar vein type mineralization occurs outside of the mineralized horizon in the Main Showing area but it is apparently related to the same minerlizing event. This includes an intersection in hole 76-2 at 223 feet where a one foot silicified and brecciated zone in a relatively unaltered flow, carries chalcopyrite and sphalerite and an outcrop, fifty feet west of line 2E + 00, of moderately altered flow material which contains copper and zinc mineralization associated with a quartz vein network.

The only noteable mineralization in hole 76-1, on the Fumarole grid, was at 111 feet where a one foot intersection in a brecciated, black quartz vein healed amygdaloidal flow carried chalcopyrite and sphalerite. Select samples from the Main Showing and Fumarole Creek drill holes and trench samples assay in the order of 1 to 7 percent zinc and 0 to 2 percent copper, indicating the grade of the vein type mineralization over very short lengths. Any attempt to sample greater lengths has resulted in low assay results.

It is felt that the mineralization intersected in hole 76-1 was not in itself the cause of the soil geochemical anomaly but is a part of the cause and is directly relatable to the geochemical source. The nature of the mineralization encountered (similar to the Main Showing mineralization) and the irregularity of the alteration zone encountered in hole 76-1 would support this belief. The intensity of alteration and concentration of mineralization encountered in 76-1 are much less significant than that observed at the Main Showing area. The apparent irregularity of the alteration zone in hole 76-1, rather than a single definable zone of alteration, combines with the preceding statement to indicate that the Fumarole mineralization is scattered in irregular vein type systems which would not permit the concentrations of mineralization needed for an economic deposit.

Weakly mineralized, angular boulders have been observed in rubble accumulations in several areas of the Fumarole Creek grid. These boulders are representative of the mineralized horizon and are generaly pyritized (1-2%) and carry minor amounts of sphalerite and chalcopyrite. Although the mineralization in these boulders is weak, and not wholly indicative of a good source for the soil geochemical anomaly, it does present further basis for the hypothesis of scattered mineralization in moderately altered volcanic units in the area of interest.

In trying to draw a more direct correlation between the Main Showing area and the Fumarole Creek area in terms of a mineralizing event, it seems that the alteration associated with the mineralized horizon rather than the stratigraphy is the best key. Stratigraphically, both anomalies appear to lie in or near a series of amygdaloidal flows and near a contact with a series of lithic tuffs.

Alteration in both anomalies consists of silicification accompanied by brecciation and the introduction of sulphides. In the Main Showing area, one relatively continuous zone of alteration in which primary textures are almost totally destroyed, encloses the bulk of the sulphide mineralization. In contrast, drill core in hole 76-1 in the Fumarole Creek anomaly indicates that this alteration is more widespread and weaker in intensity. Primary and relict textures, as well as distorted or deformed textures prevail in hole 76-1. Silicification, black quartz veining and introduced sulphide mineralization (mostly in the form of pyritization) is evident throughout the hole. Alteration products of feldspar such as kaolin and saussurite are indicative of widespread weak to moderate alteration of the volcanic section cut by 76-1. The local occurrence of talc and zones of greater silicification, brecciation and pyritization in hole 76-1 indicate that higher grades of alteration were achieved by local hydrothermal activity.

The correlation between the two areas in terms of alteration is that the sources of the altering fluids was the same but was located such that a more concentrated rapid injection occurred in the Main Showing area and a widespread weaker infusion of fluids affected the Fumarole Creek area. This correlation could be indicative of a mineralizing source being spatially closer to the Main Showing area. Unfortunately, structural deformation in this area makes the problem of locating the source rocks or other zones of concentrated alteration extremely difficult.

It is apparent that a large area has been affected by extraneous siliceous fluids. In considering the source of these fluids, it would seem that a fairly voluminous source exerting considerable pressures in order to distribute the fluids over such a vast area and to cause brecciation, would be necessary. To define a volcanogenic massive sulphide environment, it would be necessary to relate the infusion of the mineral-bearing siliceous fluids (of the altered or mineralized horizon) to an intrusive-extrusive body of material, possibly accompanied by steam explosions, which would have transected the volcanic section at the time of deposition.

The autogenous breccia, which was mapped in the Fumarole Creek area, generally conforms to these parameters, but although it carries considerable quartz veining, it does not bear any sulphide mineralization in the area of its exposure. If this body could be related to the altered horizon, then it would have to be assumed that the extent of this flow reaches from Fumarole Creek to or near the Main Showing area and that it is an irregularly shaped body which must be crudely zoned. The zoning would be in the form of an increase in siliceous and mineral bearing material which would be expected closer to the Main Showing area.

The autogenous breccia has not been observed outside the Fumarole Creek area. In its exposure there, it does not show any characteristics directly relatable to the alteration and mineralization noted in the altered horizon such as the black quartz veining. However, it is possible that the variation in textures and coloration is due to the hybrid nature of the altered zone and would not reflect the character of the exposed part of the autogenous breccia.

An alternate source of mineralizing fluids could be as eminations from a post-volcanic or coeval intrusive body which moved into post-volcanic zones of weakness such as fold structures, shears, fractures and joints. This interpretation is not favoured for several reasons. The mineralization and alteration observed does not appear to follow a pattern relatable to these structural weaknesses. Tectonic deformation of the sulphides, visible in the Main Showing area, suggest that the sulphides and altering fluids were introduced before tectonic deformation. The conformable nature of the altered zones to the stratigraphy suggests that the intruding fluids generally followed stratigraphic layers rather than structural weaknesses. The brecciated and hybrid nature of the altered zone in the Main Showing as well as the discontinuous vein-type mineralization would suggest a feeder system relatable to a volcanogenic process rather than mineralization in a post volcanic structural trap. The inclusion of the black material in quartz veins and altered zones has been known to be associated with volcanogenic deposits and this analogy may also serve as supporting evidence for a volcanogenic interpretation of the mineralization on the Tan property.

It is suggested that the altered zones are localized by syn-volcanic zones of weakness or at least more permeable zones in the volcanic section, and proximity to the source of altering fluids. If pervasive silicification accompanied brecciation and was followed by further silicification and mineralization, then a pathway could be explained through what would normally be relatively impermeable amygdaloidal flows.

Because of the tectonic deformation, visible in the Main Showing area, it is extremely difficult to predict the location of extensions or separate bodies of the altered horizon. To this end, considerable geologic knowledge is needed to further define the structure and stratigraphic and lithological variations in the area between Fumarole Creek and the Main Showing. In developing a program to obtain this data, several factors, including the above stated tectonic deformation, must be considered. Of these, a lack of outcrop exposure plus the complicating feature of the various lithologies and facies characteristics of a volcanic centre environment further inhibit surface interpretation of the area involved. Also, geophysical testing during 1976 failed to indicate massive sulphide mineralization near surface in the Fumarole Creek and Main Showing areas.

With the above factors in mind, it appears obvious that deep-hole diamond drilling, perhaps including down-hole induced polarization surveying and rock geochemical studies, would be necessary to facilitate the gathering of sufficient geological data to interpret the geological environment in detail and to define the potential for finding a massive sulphide body.

E. CONCLUSIONS

1. Mapping on the Mount McGuire side of Tamihi Creek proved that the area holds an apparently low potential for housing economic mineralization. However, the occurrence of zones of silicification and brecciation warrants further examination of specimens collected to better define the relationships of these zones to those of the Main Showing.

2. Soil profile testing on the Fumarole Creek geochemical anomaly showed that the anomaly is close to source and the excessive down-slope or down-valley dispersion does not exist.

3. Trenching in the Main Showing area aided in the definition of the mode and character of the mineralization which generally consists of discontinuous veins of chalcopyrite, sphalerite and pyrite with quartz in an altered quartz-feldspar gangue.

4. The induced polarization and Max-Min II electromagnetic surveys in the Fumarole Creek and Main Showing areas served to indicate zones of weak disseminated mineralization in areas of intense brecciation and fracturing which correlate generally with previously defined soil geochemical anomalies. The data from these surveys were used to locate diamond drill sites.

5. The diamond drilling in the Fumarole Creek and Main Showing areas, served to explain the induced polarization anomalies indicated; gave a better definition of the geological section and aided in defining the mineralized horizon.

6. Mineralization in the Fumarole Creek and Main Showing areas was seen to be related to an altered horizon high in the volcanic section. This altered or mineralized zone can be described as a zone of brecciation, silicification and mineralization generally conforming to bedding, but not restricted by it, in a sequence of intermediate flows and pyroclastics.

7 This altered zone, in part characterized by black quartz veining and mottled black alteration, appears to be representative of a volcanogenic feeder system.

8. This "system" was found to be weaker and more widespread in the areas of Fumarole Creek and stronger and quite localized in the Main Showing area possibly indicating that the source of the mineralizing solutions would be expected to be spatially closer to the Main Showing area.

9. Tectonic deformation appears to have altered the physical continuity of the altered or mineralized zone in the Main Showing area, but has not affected the style or mode of mineralization to any great degree.

10. Due to overburden cover, limited depth testing capabilities of the equipment used and tectonic deformation, it is felt that the possibility of massive sulphide mineralization existing at depth cannot be ruled out.

11. Considerable geologic knowledge is needed to better define, in detail, the complex geologic environment in terms of stratigraphy, structure and mineralizing events.

12. Because of the depth potential for mineralization, although this potential is only indicated, exploration methods must be used to obtain the above stated geologic data at depth. This work would involve deep hole diamond drilling.

F. RECOMMENDATIONS

Future work on the Tan property must be aimed at further definition of the geological environment between Fumarole Creek and the Main Showing. This work would necessitate the use of deep-hole diamond drilling with expected maximum depths in the range of 1,500 feet. An initial drilling program of approximately 5,000 feet would be recommended. At an all inclusive rate of $25 per foot, this program would cost in the order of $125,000.00. Down hole induced polarization would likely be advantageous and if a reliable method would be found, the cost of this would have to be added on. Rock geochemical studies, using mercury, silver, MgO and K2O would also be advised.

APPENDIX I

Drill Hole Logs

[redacted]GREA[redacted]LAI[redacted]EVE[redacted]MENT[redacted]MPA[redacted]F C[redacted]DA, [redacted].

DIAMOND DRILL RECORD

PROPERTY: TAN | HOLE NO.: 76-2

SHEET NUMBER: 1 of 3 | SECTION FROM: | STARTED:

LATITUDE: | DATUM: L4E + 1 + 75S (Main Show) | COMPLETED:

DEPARTURE: | BEARING: | ULTIMATE DEPTH: 238'

ELEVATION: | DIP: -90° | PROPOSED DEPTH: 300'

Depth (in ')	Lithology	Structure	Alteration	Mineralization	Core Recov.	Assay #	Assay			
0-5	Overburden									
5-47 (TRANSITION ZONE)	Altered Flow: Fine to medium grained, greenish rock. Anhedral feldspars (2mm) alt'd. to green color. Minor chlorite streaks. Quartz-calcite veining irregular. As go down the hole, alteration increases - black veining goes from 1/ft. to continuous sections of black material @ 17 ft. Minor brecciation with white feldspathic frags. from 23 ft. Rock is very black & altered from this point on with 2 mm calcite crystals. Cpy and Sph. occur as 1/8 to 1/2 inch veins accompanied by pyrite, quartz and calcite. This mineralization was observed at: 6 ft.; 9 ft.; 14 ft.; 23 ft. (Cpy); 33 ft.; 37 ft. Cpy; 46 ft. Rock is very broken from 41-47 ft. and recovery is poor. The section carries 0.5 - 2.0% Py throughout in the form of disseminations and local accumlations with qtz. and calcite.				80%					
47-57	Fine grained, grey to black, bleached white to light grey @ 53 ft. + 55 ft. Pyrite, quartz, and quartz-Py veinlets (6/ft.) to ¼ inch width; randomly oriented 1-2% Py throughout. Qtz-Cpy, covellite, pyrite, sphalerite-veinlet - ¼ inch wide @ 55 ft.				80%					

LOGGED BY: G. L. Garratt | DRILLED BY: TONTO | CORE STORED: CALGARY

[redacted]GREA[redacted]LAI[redacted]EVE[redacted]MENT[redacted]MPA[redacted]F C[redacted]DA,[redacted]. [redacted]

DIAMOND DRILL RECORD

PROPERTY TAN HOLE NO. 76-2

SHEET NUMBER 2 of 3 SECTION FROM ______ STARTED ______

LATITUDE ______ DATUM L4E + 1 + 75S (Main Show) COMPLETED ______

DEPARTURE ______ BEARING ______ ULTIMATE DEPTH 238'

ELEVATION ______ DIP -90° PROPOSED DEPTH 300'

Depth (in ')	Lithology	Structure	Alteration	Mineral-ization	Core Recov.	Assay #	Assay			
47-57	Rock appears to be composed chiefly of quartz and feldspars as									
cont'd	anhedral grains in a very fine grained matrix.									
57-122	Brecciated Locally Silicified, Altered Flow: 2 frag. types -				90%					
	1 is a grey to black, angular, rarely altenuated, very fine grained									
	rock; other is white to grey very fine grained angular to subangular									
ALTERED ZONE	rock usually cut by narrow black stringers. The frags. are generally									
	siliceous 2 mm to 2 cm in diameter, set in a fine grained matrix of quartz									
	and feldspar. Slickensides @ 45° to core wall throughout - characterized									
	by a black very fine grained mineral (Chlorite?). Local patches of greater									
	silicification contain 6" to 1" of very fine grained grey material. Quartz-									
	calcite veins @ 30° to 50° to core wall, stringers to ½" veins, 2-3 per foot,									
	from 90 feet. From 107 to 110 ft.-alt'd flow. Green fine to medium grained									
	feldspathic rock cut by randomly oriented black stringers and qtz-calcite									
	veins. More siliceous and more light frags. from 110-122 where altered flow									
	intersperses with siliceous framental. Pyrite averages approx. 1% through									
	this section as matrix filling veinlets and pods; often associated with quartz or									
	quartz-calcite. Minor amounts of sphalerite and or Cpy @104; 118; 59; 108; 121'									

122 in narrow veins with pyrite, quartz and calcite.

LOGGED BY G. L. Garratt DRILLED BY TONTO CORE STORED CALGARY

[redacted]REA[redacted]LAI[redacted]EVE[redacted]ENT[redacted]MPA[redacted]F C[redacted]DA, [redacted].

DIAMOND DRILL RECORD

PROPERTY: TAN		HOLE NO. 76-2	
SHEET NUMBER: 3 of 3	SECTION FROM:	STARTED:	
LATITUDE:	DATUM: L4E + 1 + 75S (Main Show Grid)	COMPLETED:	
DEPARTURE:	BEARING:	ULTIMATE DEPTH: 238'	
ELEVATION:	DIP: -90°	PROPOSED DEPTH: 300'	

Depth (in ')	Lithology	Structure	Alteration	Mineral-ization	Core Recov.	Assay #	Assay			
122-139	Transition Zone: intermittent alt'd. green flow and black siliceous alteration zones. Flow: rare chloritic amygdules; cross-cut by black veinlets and qtz-calcite veinlets. Black alt'n. gives local mottled appearnce. Cpy, Sph. Py in qtz-calc. in minor amounts throughout.				95%					
139 -238	Amygdaloidal Andesite Flow: green, fine to medium grained rock with 2 mm to 5 mm chlorite filled amygdules (occasionally have calcite core). Qtz-calcite veins, stringers to ½" wide, 3 to 4 per foot, Locally brecciated with the fragments looking generally unaltered and 1 inch in diameter. Cpy, Sph, Py, quartz-calcite vein - 2" wide at 152 feet. Minor amounts of Cpy noted through the core, appear to be disseminated but may not be. Brecciated and locally siliceous zone from 219 to 225 ft. Within this is a 6" quartz-calc.-Cpy sphalerite vein. Trace to minor diss. py. Epidote in a quartz-calcite vein ¼" wide at 231 ft.				100%					
		END OF HOLE - 238 Ft.								

LOGGED BY G. L. Garratt DRILLED BY TONTO CORE STORED CALGARY

GREA[redacted]LAI[redacted]EVE[redacted]MEN[redacted]MPA[redacted]F C[redacted]DA,[redacted].

DIAMOND DRILL RECORD

PROPERTY TAN | HOLE NO. 76-1

SHEET NUMBER 1 of 5 | SECTION FROM | STARTED

LATITUDE | DATUM L38S + 11W | COMPLETED

DEPARTURE | BEARING 95 | ULTIMATE DEPTH 248'

ELEVATION 4,127' | DIP -80 | PROPOSED DEPTH 700'

Depth (in ')	Lithology	Structure	Alteration	Mineral-ization	Core Recov.	Assay #	Assay			
0-35	Overburden									
35-58	Green Amygdaloidal Andesite Flow: predominantly chlorite filled amygdules to ½ in. in lenghth - occasionally calcite filled-chlorite rimmed. Amygdules aligned @ 90° to core wall. Rare quartz-chl. veinlets @ $45^{\circ}+10^{\circ}$ dip. Flow appears to shallow dipping @ 10° - 15°. No sulphides visible. Alteration weak (chl.-calc.)			Nil	50%					
58-63.5	Alt'd Flow (as above) poor recovery to 62'. 2"-3" shear at 62', appears banded with siliceous, stretched frags.			Nil	50%					
63.5-64	Shear - AS @ 62'. iron oxides on fracture or cleavage surfaces 90° to core wall.			Nil						
64-73	Siliceous Fragmental - weak alignment 90° to core wall. < 1% diss. subhedral to euhedral cubic pyrite. Occasional talc alteration on 90° fractures. Black stringer alteration throughout. Rock is white to beige in color. Iron oxide stain along some stringers.				80%					

LOGGED BY G. L. Garratt | DRILLED BY TONTO | CORE STORED CALGARY

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

DIAMOND DRILL RECORD

PROPERTY TAN | HOLE NO. 76-1

SHEET NUMBER 2 of 5 | SECTION FROM | STARTED

LATITUDE | DATUM L38S + 11W | COMPLETED

DEPARTURE | BEARING 95° | ULTIMATE DEPTH 248'

ELEVATION 4,127' | DIP - 80° | PROPOSED DEPTH 700'

Depth (in ')	Lithology	Structure	Alteration	Mineral-ization	Core Recov.	Assay #	Assay			
73-74	Altered volcanic - very fine grained grey-green to grey-black				60%					
	Siliceous where black; felspathic otherwise. Pervasive and irregular									
	black stringer alteration. Approx. 0.5% pyrite along fractures									
74-81	Fragmental: small (¼") rounded grains of feldspar and quartz				70%					
	Feldspar kaolinitized and occasionally greenish in color indicating									
	either small amounts of montmorillanite or saussuritization. Rare									
	feldspathic fragments (¼ - ½" diam.) are cut by black stringers. Matrix									
	appears siliceous and occasionally see green siliceous bands ¼"									
	thick. Trace to minor amounts of pyrite disseminated throughout.									
	There appears to an alignment of grains @ 80° to the core wall.									
	Either end of this section appears bleached and is very fine grained,									
	tan in color and is cut by black to white quartz veins (2-3/inch)									
81-110	Very fine grained, green volcanic. Possibly at tuff, indicating by									
	a weak apparent bedding @ 98 ft. Might be a severely altered									
	flow. Grey to black in color where alteration by black quartz									
	rich veins is more pervasive. Feldspathic in composition, moderate.									

LOGGED BY: G. L. Garratt | DRILLED BY TONTO | CORE STORED CALGARY

[redacted] GREA[redacted]LAI[redacted]EVE[redacted]MENT[redacted]MPA[redacted]F [redacted]DA,[redacted]. [redacted]

DIAMOND DRILL RECORD

PROPERTY TAN — HOLE NO. 96-1

SHEET NUMBER 3 of 5 — SECTION FROM — STARTED

LATITUDE — DATUM L38S + 11W — COMPLETED

DEPARTURE — BEARING 95° — ULTIMATE DEPTH 248'

ELEVATION 4,127' — DIP -80° — PROPOSED DEPTH 700'

Depth (in ')	Lithology	Structure	Alteration	Mineral-ization	Core Recov.	Assay #	Assay			
81-110	Alteration of feldspars makes the rock soft.		White quartz veins		60%					
cont'd	(1/8 - 1/4" wide) @ 30°	to core wall. (1 per ft.)	Brecciated throughout							
	but distinct fragments or	fragment outlines are rare due to	the nature of							
	the intruding quartz-rich	black stringers.	Subhedral cubic pyrite							
	up to 0.5% in local accumulations along quartz rich sections.									
	Trace Cpy. at 98 ft. Pyritic sections:	81"	- 84' - trace;	tr. Cpy.						
		84'	- 86' - 0.5%							
		86'	- 87.5' - trace							
		87.5'	- 95' - 1%							
		95'	- 100' - trace							
		100'	- 110' - 0.5% -	1%						
	Minor talc alteration on	90° fractures @ 95'	- 96'							
110-118	Brecciated amygdaloidal andesite flow - dark green in color. Chlorite									
	and occasionally quartz-calcite filled amygdules. Black quartz									
	veining healing the rock; pyrite disseminated and in veinlets									
	to 1% throughout. 2% Py @ 111' - 112'. At approximately			Minor Cpy,						
	111', Cpy. and Sph.along thin quartz veinlets			Sph.						

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DIAMOND DRILL RECORD

PROPERTY TAN | HOLE NO. 76-1

SHEET NUMBER 4 of 5 | SECTION FROM | STARTED

LATITUDE | DATUM L38S + 11W | COMPLETED

DEPARTURE | BEARING 95° | ULTIMATE DEPTH 248'

ELEVATION 4,127' | DIP -80° | PROPOSED DEPTH 700'

Depth (in ')	Lithology / Structure / Alteration / Mineralization	Core Recov.	Assay #	Assay
118-211	Brecciated altered flow - Quartz eyes and rounded, sometimes stretched grains of altered feldspar in a fine grained siliceous matrix. Steaks of chlorite become more abundant from approx. 155' and may represent destroyed mafics (or amygdules?) Feldspars are commonly greenish in color indicating saussuritization. Short sections of siliceous alteration and the occurrence of black quartz stringers occur @ 129'-132'; 137'; 142'-145': 184'- 188'(20% recovery); 201'-202' - These sections carry 1-2% py. Pyrite in the rest of the section occurs as disseminated subhedral grains <1% (0.5% average). A weak alignment of grains appears to be @70°-90° to the core wall. Locally this angle increases to 50%. This alignment may be related to invading siliceous fluids.	60% Average		
211-226	Siliceous fragmental: may be a more altered equivalent of the above. Contains a variety of frags.: black, soft, (brownish streak) shard-like to sub-angular frags.; grey-green angular frags. with rare fldsp. grains within; white to grey angular, very fine grained frags. Matrix appears to be fine grained combination of quartz and fldsp. Cubic diss. pyrite - 1-2% throughout.	55%		

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GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

DIAMOND DRILL RECORD

PROPERTY TAN HOLE NO. 76-1

SHEET NUMBER 5 of 5 SECTION FROM STARTED

LATITUDE DATUM L38S + 11W COMPLETED

DEPARTURE BEARING 95° ULTIMATE DEPTH 248'

ELEVATION 4,127' DIP -80° PROPOSED DEPTH 700'

Depth (in ')	Lithology	Structure	Alteration	Mineral-ization	Core Recov.	Assay #	Assay			
226-229	Mottled flow: Chlorite filled amygdules in a fine grained green to green-brown matrix. Similar to flow at collar. 1-2% pyrite disseminated throughout. Minor black quartz veining.				60%					
229-248	Altered Volcanic - grey to greenish to black. Pervasive black qtz. stringers. Locally brecciated. Siliceous, especially near greater concentrations of black stringers. < 0.5% py. (was called cherty breccia). Considerable cave material apparent.				30%					
		248' - End of Hole								

LOGGED BY G. L. Garratt DRILLED BY TONTO CORE STORED CALGARY

APPENDIX II

SUMMARY OF ASSAYS FROM DIAMOND DRILL HOLES

Diamond Drill Hole 76-I Core Samples and Assays

Sample No.	Sample Footage (ft.)	Sample Interval (ft.)	Assays: Cu,Zn (ppm)
76-G-22	111.5 - 111.8	0.3	1760 (0.17%) < 4000 (0.52%)
76-G-23	111.0 - 111.5	0.5	800, 3520
76-G-24	101.5 - 102.0	0.5	21,184
76-G-25	122.0	0.25	126, 233
76-G-26	135.0	0.25	12, 1040
76-G-27	141.0	0.20	20, 840
76-G-28	144.0	0.25	8, 127
76-G-29	200.0 - 200.5	0.5	7, 164
76-G-30	198.5 - 199.0	0.5	40, 344
76-G-31	211.0 - 211.5	0.5	6, 108
76-G-32	214.0 - 214.5	0.5	8, 1400
76-G-33	216.5 - 216.8	0.3	12, 2640
76-G-34	226 - 227	1.0	160, 1120
76-G-35	232.5 - 233	0.5	405, 1320
76-G-36	243.0	0.2	255, 780
76-G-37	247.0	0.2	14, 275
76-G-38	137.0 - 137.5	0.5	98, 248

Diamond Drill Hole 76-2: Core Samples and Assays

Sample No.	Sample Footage (ft.)	Sample Interval (ft.)	Assays: Cu, Zn (ppm)
76-G-63	5.0	2 inches	0.08, 0.30
76-G-64	6.0 - 7.0	1.0	0.02, 0.03
76-G-65	7.0	2 inches	0.05, 0.05
76-G-66	8.0 - 9.0	1.0	0.05, 0.12
76-G-67	9.0 - 10.0	1.0	0.02, 0.12
76-G-68	10.5 - 10.7	0.2	0.02, 0.03
76-G-69	11.0 - 12.0	1.0	0.03, 0.04
76-G-70	12.0 - 13.0	1.0	0.03, 0.08
76-G-71	13.5 - 14.0	0.5	0.06, 0.08
76-G-72	14.0	2 inches	0.13, 0.02
76-G-73	14.5	2 inches	<0.01, 0.25
76-G-74	16.0	2 inches	0.33, 0.03
76-G-75	16.5 - 17.00	0.5	0.07, 0.21
76-G-76	19.5 - 20.5	1.0	0.02, 0.35
76-G-77	23.0 - 23.5	0.5	0.04, 0.07
76-G-78	24.0	2 inches	0.03, 0.04
76-G-79	30.5, 31.5	1.0	0.05, 0.04
76-G-80	32.0 - 33.0	1.0	0.08, 0.22
76-G-81	33.0	2 inches	0.28, 3.84
76-G-82	34.0	2 inches	0.06, 0.51
76-G-83	35.0 - 36.0	0.5	0.02, 0.04
76-G-84	45.0 - 46.0	1.0	0.01, 0.63
76-G-85	49.0	2 inches	0.29, 0.05
76-G-86	55.0 - 55.25	0.25	0.43, 1.06
76-G-87	58.0	2 inches	0.03, 1.51
76-G-88	59.0 - 59.25	0.25	0.03, 7.68
76-G-89	70.0	1.5 inches	0.07, 1.34
76-G-90	72.5 - 73.0	0.5	0.13, 0.52
76-G-91	74.5 - 76.0	0.5	0.14, 0.35
76-G-92	89.0	2 inches	< 0.01, 0.09
76-G-93	105.0 - 105.25	0.25	0.01, 0.11
76-G-94	108.0 - 108.3	0.3	0.02, 0.10
76-G-95	116.0 - 116.5	0.5	0.08, 0.19
76-G-96	117.0 - 117.25	0.25	0.01, 0.10
76-G-97	118.0 - 120.5	2.5	0.12, 1.26
76-G-98	120.5 - 122.5	2.0	0.14, 0.35
76-G-99	123.0 - 123.5	1.5	< 0.01, 0.04
76-G-100	126.0 - 126.25	0.25	0.05, 0.17
76-G-101	127.0 - 128.5	1.5	0.06, 0.56
76-G-102	132.0 - 133.0	1.0	0.02, 0.15
76-G-103	133.5 - 134.0	0.5	0.04, 0.01
76-G-104	135.0 - 136.0	1.0	0.04, 0.06
76-G-105	136.0 - 137.5	1.5	0.03, 0.07
76-G-106	138.0 - 139.0	1.0	0.09, 0.07
76-G-107	143.5 - 146.5	3.0	0.03, 0.05
76-G-108	152.0 - 152.25	0.25	< 0.01, 3.15
76-G-109	223.0 - 224.0	1.0	0.11, 3.84

APPENDIX III

GEOCHEMICAL ANALYSES SHEETS

212 BROOKSBANK AVE.
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CANADA V7J 2C1
TELEPHONE: 985-0648
AREA CODE: 604

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• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 37843

INVOICE NO. 17524

RECEIVED July 27/76

ANALYSED July 28/76

TO: Norcen Energy Resources
Mineral Ex-ploration
1715 - 5th Ave., S.W.
Calgary, Alta.

ATTN: MD. McInnis cc: G. Garrett

SAMPLE NO. :	PPM Copper	PPM Zinc	Rocks
76 G - 22	1760	>4000	
23	800	3520	
24	21	184	Hole 76-1
25	126	233	
26	12	1040	
27	20	840	
28	8	127	
29	7	164	
30	40	344	
31	6	108	
32	8	1400	
33	12	2640	
34	160	1120	
35	405	1320	
36	255	780	
37	14	275	
76 G - 38	98	248	

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: B. Twaites

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AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ASSAY

CERTIFICATE NO. 37843

INVOICE NO. 17524

RECEIVED July 27/76

ANALYSED July 28/76

TO: Norcen Energy Resources
Mineral Exploration
1715 - 5th Ave., S.W.
Calgary, Alta.

ATTN: M.D. McInnis cc: G. Garrett

SAMPLE NO. :	% Copper	% ZINC	DDH 76-1
76 G - 22	0.17	0.52	

REGISTERED ASSAYER, PROVINCE OF BRITISH COLUMBIA

CTA MEMBER CANADIAN TESTING ASSOCIATION

CHEMEX LABS LTD.

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CANADA V7J 2C1
TELEPHONE: 985-0648
AREA CODE: 604

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 31559

INVOICE NO. 17636

RECEIVED August 4/76

ANALYSED August 6/76

TO: Norcen Energy Resources
Mineral Exploration
1715 - 5th Ave., S.W.
Calgary, Alta.

ATTN: Glen Garrett

SAMPLE NO. :	% Copper	% Zinc	Diamond Drill Hole 76-2
76 G - 63	0.08	0.30	
64	0.02	0.03	
65	0.05	0.05	
66	0.05	0.12	
67	0.01	0.12	
68	0.02	0.03	
69	0.03	0.04	
70	0.0[illegible]	0.08	
71	0.06	0.08	
72	0.13	0.02	
73	< 0.01	0.25	
74	0.33	0.03	
75	0.07	0.21	
76	0.02	0.35	
77	0.04	0.07	
78	0.03	0.04	
79	0.05	0.04	
80	0.08	0.22	
81	0.28	3.84	
82	0.06	0.51	
83	0.02	0.04	
84	0.01	0.63	
85	0.29	0.05	
86	0.43	1.06	
87	0.03	1.51	
88	0.03	7.68	
89	0.07	1.34	
90	0.13	0.52	
91	0.14	0.35	
92	< 0.01	0.09	
93	0.01	0.11	
94	0.02	0.10	
95	0.08	0.19	
96	< 0.01	0.10	
97	0.12	1.26	
98	0.14	0.35	
99	< 0.01	0.04	
100	0.05	0.17	
101	0.06	0.56	
76 g - 102	0.02	0.15	

CERTIFIED BY: [signature]

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TELEPHONE: 985-0648
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ASSAY

CERTIFICATE NO. 31560
INVOICE NO. 17636
RECEIVED August 4/76
ANALYSED August 6/76

TO: Norcen Energy Resources
Mineral Exploration
1715 - 5th Ave., S.W.
Calgary, Alta.

ATTN: Glen Garrett

DDH - 76 - 2

SAMPLE NO. :	% Copper	% Zinc
76 G - 103	0.04	0.01
104	0.04	0.06
105	0.03	0.07
106	0.09	0.07
107	0.03	0.05
108	< 0.01	3.15
76 G - 109	0.11	3.84

REGISTERED ASSAYER, PROVINCE OF BRITISH COLUMBIA

SOIL PROFILE RESULTS - FUMAROLE CREEK GRID

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 37959
INVOICE NO. 17608
RECEIVED Aug.4/76
ANALYSED Aug.5/76

TO: Norcen Energy Resources,
Mineral Expl.,
1715 - 5th Ave. S.W.,
Calgary, Alberta
ATTN: cc"Iskut

SAMPLE NO. :	PPM Copper	PPM Zinc
76G-205	72	381
206	94	500
207	170	680
208	186	780
209	165	720
210	54	305
211	46	265
212	28	155
213	38	206
214	41	285
215	56	375
216	60	295
217	76	295
218	24	86
219	22	140
220	33	184
221	42	225
222	14	105
223	52	344
224	72	375
225	64	360
226	20	140
227	40	248
228	54	240
76G-229	66	265

CERTIFIED BY: [signature]

CHEMEX LABS LTD.

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CANADA V7J 2C1
TELEPHONE: 985-0648
AREA CODE: 604

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 37958
INVOICE NO. 17608
RECEIVED Aug.4/76
ANALYSED Aug.5/76

TO:
Norcen Energy Resources,
Mineral Expl.,
1715 - 5th Ave. S.W.,
ATTN: Calgary, Alberta

~~cc:Iskut~~

SAMPLE NO. :	PPM Copper	PPM Zinc
76G-132	124	400
133'	74	275
134	54	169
135	98	392
136	131	500
137	33	115
138	38	218
139	80	184
140	84	179
141	118	169
142	46	123
143	50	160
144	122	392
145	333	1120
146	355	1160
147	68	285
148	82	275
149	88	285
150	100	211
151	90	233
152	41	255
153	62	392
154	118	580
155	126	640
156	103	500
157	41	194
158	38	164
159	42	206
160	82	400
161	86	317
162	33	344
163	52	344
164	63	285
165	191	450
166	215	392
200	33	194
201	58	400
202	74	480
203	76	330
76G-204	92	500

MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: ....

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: 985-0648
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 37631
INVOICE NO. 17282
RECEIVED July 13/76
ANALYSED July 15/76

TO: Norcen Energy Resources
Mineral Exploration
1715 - 5th Ave., S.W.
Calgary, Alta.
ATTN: Mr. D. McInnis

cc: G. L. Garrett

SAMPLE NO. :	PPM Copper	PPM Zinc
76-B - 210	350	760
211	434	920
212	434	1000
213	458	880
214	655	1280
215	640	1240
216	36	240
217	58	344
218	76	420
219	76	450
220	33	233
221	84	540
222	108	620
223	98	500
224	333	1720
225	175	720
226	175	700
227	170	1040
228	197	1760
229	165	1400
230	186	265
231	323	392
232	189	240
233	154	880
234	136	920
235	128	880
236	134	960
237	66	375
238	128	960
239	116	720
240	84	344
241	92	400
242	163	580
243	165	560
244	209	1000
245	248	1000
246	152	800
247	131	780
248	160	1200
76-B - 249	309	1840
STD.	100	200

soil profiles - Fumarole

CERTIFIED BY: [signature]

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NORTH VANCOUVER, B.C.
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TELEPHONE: 985-0648
AREA CODE: 604
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CERTIFICATE OF ANALYSIS

TO: Norcen Energy Resources
Minerals Exploration
1715 - 5th Ave., S.W.
Calgary, Alta.

ATTN: Mr. McInnis cc: C. Garrett

CERTIFICATE NO. 37632
INVOICE NO. 17282
RECEIVED July 13/76
ANALYSED July 15/76

SAMPLE NO. :	PPM Copper	PPM Zinc
76 - B - 250	98	640
251	82	560
76 - B - 252	66	500
STD.	100	206

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CERTIFIED BY: [signature]

Muir
Glen Garratt

CHEMEX LABS LTD.

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CERTIFICATE OF ASSAY

CERTIFICATE NO. 31393

INVOICE NO. 17115

RECEIVED July 1/76

ANALYSED July 5/76

TO: Norcen Energy Resources
Mineral Exploration
1715 5th AVe. S. W.
Calgary, Alta.

ATTN: Mr. M. McInnis

cc: Glen Garratt, Sardis, B.C.

SAMPLE NO. :	% Copper	% Zinc	TRENCH SAMPLES
76-G-11	0.07	0.47	
12	< 0.01	< 0.01	
13	< 0.01	< 0.01	
14	0.02	0.01	
15	1.98	4.26	
16	< 0.01	0.02	
17	< 0.01	0.04	
18	< 0.01	0.05	
76-G-19	< 0.01	0.02	

CTA MEMBER CANADIAN TESTING ASSOCIATION

[signature]
REGISTERED ASSAYER, PROVINCE OF BRITISH COLUMBIA

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
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AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 37633
INVOICE NO. 17282
RECEIVED July 13/76
ANALYSED July 15/76

TO: Norcen Energy Resources
Mineral Exploration
1715 - 5th Ave., S.W.
Calgary, Alta.

ATTN: Mr. M. McInnis cc: G. Garrett

SAMPLE NO. :	PPM Copper	PPM Zinc	Rocks
76 - G - 20	22	164	
21	30	248	
22	58	189	
23	100	305	
76 - G - 24	51	400	
STD.	102	206	

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: [signature]

Mike Gill Garnell

CHEMEX LABS LTD.

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TELEPHONE: 985-0648
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 37489
INVOICE NO. 17121
RECEIVED July 1/76
ANALYSED July 5/76

TO: Norcen Energy Resources
Mineral Exploration
1715 5th Ave. S.W.
Calgary, Alta.

ATTN: Mr. Mike McInnis cc: G. Garratt-Sardis, B.C.

SAMPLE NO. :	PPM Copper	PPM Lead	PPM Zinc	PPM Silver	Rock Geochem
DG 1	2160		> 4000	5.2	Mt. McGuire Mapping
DG 4	521		> 4000	0.5	
TB 1	14		39		
TB 5	1600		77		
76 M 51	20	6	43	0.8	
74	76		50		
86	2710		43		
76 M 87	> 4000		70		

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: [signature]

APPENDIX IV

GEOPHYSICAL REPORTS

EAGLE GEOPHYSICS LIMITED
CONSULTING AND CONTRACTING SERVICES IN MINING GEOPHYSICS

JOHN LLOYD, M.Sc., P.Eng.
PETER E. FOX, Ph.D., P.Eng.

575 LUCERNE PLACE
NORTH VANCOUVER, B.C.
TELEPHONE (604) 988-6488

June 29, 1976

Mr. M. McInnis,
Great Plains Development Company of Canada Ltd.,
Minerals Division,
715 - 5th Avenue Southwest,
Calgary, Alberta,
T2P 2X7.

Dear Mike:

This letter will act as a preliminary report on the IP survey just completed on the TAN property near Chilliwack, B. C. Two sets of copies of the field plots have been sent to you and one set to Glen Garratt in Chilliwack.

On the TAN showing itself a good response was obtained on lines 2+00E, 4+00E and 6+00E. On line 0+00 a very weak response was recorded; this line was very short, because of rock bluffs at each of its ends. Cost considerations did not permit us to survey line 8+00E; this was unfortunate since a fairly good response was obtained on line 6+00E.

Since the IP response is quite complex, it is difficult without an in-depth study of the data and response to type curves to determine the dip width and nature (massive or disseminated) of the mineralized zone. Since the zone outcrops and a strong response was obtained, for x = 100 ft., and n = 1, directly over the showing the "depth to top" factor is readily evident.

The dip of the zone is difficult to determine because of the complexity of the IP response. This will require further study. I am not sure if you, or anyone else, has drilled the showing and therefore I know little about the geology. I am sure you know a great deal more.

The width of the zone is expected to vary from about 50 to 200 feet. However to the south of the B.L. (it cuts off sharply to the north) there is evidence to suggest (at least on line 4+00E) that the zone may be up to 500 feet wide. Here the response is reduced and may indicate disseminated mineralization or we may be traversing across the apparent width of a very gently dipping zone.

. . . . 2/

There is no strong evidence to suggest that this mineralized zone is of a truly massive nature. Massive sections could however exist without being readily recognizable in the IP data. Hopefully the E.M. survey will help you here. The zone would appear to be most conductive, and probably more massive, on line 2+00E. The response here is less complex.

On the main grid, two anomalous trends have been detected:-

Anomaly #1

Line Number	Surface Projection of Zone	
8+00S	7+50W	
12+00S	8+50W	
16+00S	9+00W	
20+00S	8+50W	best response
24+00S	Not surveyed	
28+00S	No response	

Anomaly #2

36+00S	4+00W
38+00S	5+00W
40+00S	7+50W
42+00S	6+00W

These two anomalies, whilst being less attractive than the anomaly over the TAN showing (not solely because of the reduced amplitude of course) are worthy of further consideration. One characteristic common to the majority of the responses obtained is the increase in both resistivity and chargeability on the first separation measurements. One notable exception is the response on line 2+00E over the TAN showing.

I am making no specific recommendations, such as drill locations, at the moment. I would like to know the outcome of the E.M. work before proceeding further.

From July 1 to July 21, 1976 I can be reached, in the evenings, at Logan Lake Hotel, phone (604) 523-6211, should you require any further discussion about the IP survey.

Yours very truly,

EAGLE GEOPHYSICS LIMITED,

John Lloyd

John Lloyd, P. Eng.
Geophysicist.

JL:aa Copy sent to Glen Garratt.

John Betz Limited

(416) 621-5682

7 BOXBURY ROAD
ETOBICOKE, ONT.
CANADA, M9C 2W1

REPORT ON THE MAXMIN II EM SURVEY
NORCEN ENERGY RESOURCES LTD.
TAN OPTION
NEW WESTMINSTER MINING DIVISION, B.C.

Toronto, Ontario
August, 1976

John Betz Limited

LIST OF CONTENTS

REPORT ON THE MAXMIN II EM SURVEY FOR NORCEN ENERGY RESOURCES LTD., TAN CLAIM GROUP, NEW WESTMINSTER MINING DIVISION, BRITISH COLUMBIA

PREAMBLE

After the assessment information and the statement of the objective of the survey are sections dealing with the equipment and its application toward the detection of massive sulphide zones. By introducing these sections before the section on the interpretation of the field results, it is the writer's intention to give the reader a definite feeling for the effectiveness of the coverage on the Tan claim group.

ASSESSMENT INFORMATION

The Tan claim group is located 15 miles south of the city of Chilliwack in the New Westminster mining division of British Columbia. It lies immediately north of the British Columbia-Washington border.

At the time of the survey the Tan claim group was under option by Norcen Energy Resources Ltd. The latter company commissioned the MaxMin II survey on two parts of the claim group - one part known as the Fumarole grid and the other the Main Showing grid.

The field work was done in late June and early July of 1976.

OBJECTIVE

The objective of this survey was to test the volcanic tuff units on the Fumarole and Main Showing grids for the presence of massive sulphide zones.

Strong copper and zinc geochemical anomalies suggest the presence of near-surface sulphides. The presence of disseminated, near-surface sulphides was corroborated on both grids by an IP survey immediately preceding the MaxMin II survey. Also, disseminated sulphides are visible in trenches on the Main Showing grid.

However, in view of the absence of a distinct resistivity "low" accompanying the IP results, it is clear that substantial amounts of massive sulphides, or interconnected veinlet sulphides (sphalerite notwithstanding) do not exist near bedrock surface on either of the two grids. Thus, the role of the MaxMin II survey was more specifically to detect deep-seated massive sulphide zones.

EQUIPMENT AND PROCEDURES

The MaxMin II system was designed to operate in two modes -- one called Max-Coupled and the other Min-Coupled. The Max-Coupled mode uses in-line coplanar coils, wherein the two coils are held parallel to the mean slope of the terrain. In flat terrain, the Max-Coupled mode is one in the same with the well-known Horizontal Loop mode. The Min-Coupled mode uses in-line mutually perpendicular coils, wherein the turns of the transmitting and receiving coils are parallel and perpendicular, respectively, to the mean slope of the terrain.

The Max-Coupled mode is the most commonly used, because it is easy to perform and it couples well with most conductor configurations, giving recognizable anomaly shapes. However, the Min-Coupled mode is of proven superiority in the case of deep, very wide conductive zones, where it gives larger anomaly amplitudes than the Max-Coupled mode. Also, the Min-Coupled anomaly shape points unequivocally to a wide source, whereas the Max-Coupled anomaly shape over a single wide conductor at depth is similar to that over two separate parallel conductors at depth.

The Max-Coupled mode was used on both Tan grids. The Min-Coupled mode was used on one line only in an effort to enhance the interpretation given by the Max-Coupled results.

SECANT CHAINING

The lines "run" during this survey were first secant chained to insure full control over the coil geometry (separation and tilt). This is necessary to obtain clean "in-phase" data. Clean in-phase data are necessary for the detection of deep massive sulphide bodies. This point can be better appreciated when the reader bears in mind that massive sulphide bodies nearly always have a larger in-phase than out-of-phase response over the frequency range of the MaxMin II system. Nonetheless, the amplitude of the in-phase response can be small due to an appreciable body depth. The in-phase noise resulting from poor control of the coil geometry can "bury" the low amplitude in-phase response from a deep target.

A by-product of the secant chaining is a set of topographic contours with exact line and station locations over the extent of the grid. The grid can then be accurately located on a contour map made from ortho photos, by matching the two sets of contours.

It was not possible to make a direct overlay of the topo contour plan from secant chaining on that from ortho photos while on the job site, because there were no local facilities to reduce the scale of the former plan. However, it is of interest to note that a visual inspection of the two plans revealed an error in the topo contours from ortho photos (probably due to photo distortion) in the southeast part of the Fumarole grid.

COIL SPACING AND DEPTH OF DETECTION

A horizontal-plane coil spacing of 500 ft (S=500 ft or 153 m) was used during the survey to insure deep search. A 500 ft horizontally-projected coil spacing is about 600 ft on the steep slopes of the Tan grids. With the small in-phase noise envelope of ±1½%, provided by secant chaining, very large massive sulphide bodies, dipping at 30° to the slope, can be detected to a normal-to-slope depth of 0.83 of the coil spacing, i.e. to a depth of 0.83 x 600 ft, or nearly 500 ft (150 m) normal to the slope. However, more realistically-sized massive sulphide bodies, e.g. strike-length x dip-extent = 1200 ft x 1200 ft (365 m x 365 m), can only be detected to a normal-to-slope depth of 0.7 of the coil spacing, i.e. about 0.7 x 600 = 420 ft or 130 m, in the presence of a ±1½% in-phase noise envelope. Of course, the depth of detection is less for smaller-sized targets. For instance, a massive sulphide zone (600 ft x 1200 ft or 180 m x 365 m) would be detectable to a normal-to-slope depth of about 350 ft or 105 m for the same coil spacing and in-phase noise envelope as stated above.

These statements, pertaining to the depth of detection, are based on scaled-modelling results*, enhanced by field results obtained

* The source of the scaled modelling results is from the writer's personal modelling suite, and from a publication entitled "Type Curves for the Interpretation of Slingram Anomalies etc." Geological Survey of Finland, Report of Investigations No.1, by M. Ketola and M. Puranen.

by the writer over deep conductive sources*.

An example of the MaxMin II profiles, to be expected over a deep sulphide source, can be seen in the initial profile sheet, entitled "Model Line", toward the end of the report. It is clear from these profiles that a moderately large massive sulphide lense (365 m x 365 m) would be readily detectable at a normal-to-slope depth well in excess of 350 ft or 105 m, if the in-phase noise envelope does not exceed $\pm 1\frac{1}{2}\%$, i.e. the noise level of the recent survey.

The following table summarizes the depth-of-detection capability of the MaxMin II system for different-sized massive sulphide zones, dipping at 30° to the slope, when using a five-station coil spacing (about 600 ft or 183 m on a steep slope):

Strike-Length x Depth-Extent	Depth of Detection
≥2000 ft x ≥2000 ft	500 ft
1200 ft x 1200 ft	420 ft
600 ft x 1200 ft	350 ft

THE "σt" OR CONDUCTIVITY-THICKNESS PRODUCT OF MASSIVE SULPHIDE ZONES

To this point in the report, the expression massive sulphide zone has not been qualified in terms of its σt value.

The "σt" of the sulphide lense shown under the "Model Line", in the profile section of this report, is of the order of 1000 mhos, or

* The results over deep conductive sources are shown in a test program report for the MaxMin II system available from Apex Parametrics Ltd., and in a suite of demonstration posters for the MaxMin II system, a copy of which is held by Norcen Energy Resources Ltd.

greater. A σt value of $\geqslant$ 1000 mhos may appear large compared to some of the values seen on maps and in the literature. However, it must be remembered that nearly all published values to date are affected by phenomena called "current gathering" and "thickness"*, and as a result are much lower than the true values. It generally requires a very low frequency to get clear of the "current gathering" and "thickness" effects, when dealing with a massive sulphide lense in Nature.

Although the lowest frequency (222 Hz) of the MaxMin II system is not generally low enough to be free of the above-mentioned effects, it is lower than most available system frequencies. Nonetheless, with the MaxMin II system, a near "true" value of σt can be obtained by computing a value for each of the four system frequencies, based on interpretive curves from laboratory-scaled modelling with thin sheets in free space. It has been found that such computed values of σt increase as the frequency decreases. By extrapolating to the region of very low frequencies, a reasonably "true" value of σt can be obtained**.

By using the approach described in the preceding paragraph, a "true" σt value was obtained for three well-known volcanogenic massive sulphide bodies of economical value in eastern Canada. The story is told

* These phenomena or effects are described with appropriate references on the demonstration posters referred to in the footnote on page 5.

** These procedures are demonstrated on the above-mentioned posters.

in the following table:

Name of Deposit	Location	Type of Sulphides	Thickness of Zone, under test line	"True"
Le Moine	Chibougamau area	Massive pyrite with sphalerite & chalcopyrite.	4 to 5 meters	3000 mhos
New Insco	Noranda area	Massive pyrrhotite with chalcopyrite.	15 to 17 meters	9000 mhos
Iso (west end)	" "	Massive silicified fine-grained pyrite with sphalerite.	16 meters	50 mhos
Iso (central part)	" "	Same as above on hanging-wall side. Chalcopyrite zone on footwall side.	14 meters 3 meters	1000 mhos

It is apparent from the above table that, where a few-meter thickness of massive (coarse-grained) pyrite, massive pyrrhotite, or massive chalcopyrite is involved, the "true" σt values can be quite high, i.e. $\geqslant$ 1000 mhos. However, in the case of fine-grained silicified pyrite with sphalerite, the σt value can be quite low -- at times substantially lower than the 50 mho value determined for the west end of the Iso sulphide deposit.

Based on the contents of the preceding paragraph, it can be said that the σt value of 1000 mhos for the conductive zone under the "Model Line" is not unrealistically high, when considering a chalcopyrite-rich content. Given that a σt value of 1000 mhos is realistic, the depth-of-detection figures, stated in the table on page 5, are also realistic.

For zones containing massive sphalerite (a non-conductor), with little or no associated metallic sulphides, the "σt" can be much smaller than 1000 mhos. However, as long as there is enough metallic sulphide to keep the "true" σt value above 10 mhos, the depth of detection figures will be almost as large at the highest system frequency (1777 Hz) as they will for a 1000 mho conductor. In other words, the amplitude of the in-phase anomaly will be above the in-phase noise envelope at 1777 Hz (but not at the lower frequencies) for a 10 mho sulphide zone at the depths listed in the table on page 5. As the "σt" of the sulphide zone drops below 10 mhos, the in-phase anomaly amplitude at 1777 Hz decreases rapidly, and the sulphide zone must become progressively more shallow, than listed in the table on page 5, to be detected by the MaxMin II system.

As far as stratabound massive sulphide zones are concerned, a "σt" of less than 10 mhos means that there cannot be a chalcopyrite-rich layer. Zones of such low σt values would get their conductivity primarily from fine-grained pyrite, and the only chance for economical viability would be in large amounts of sphalerite, possibly with precious metals.

THE CHOICE OF SYSTEM FREQUENCIES

During the reconnaissance phase of a survey, two widespread frequencies are routinely used. The reasons for this are as follows:

a) The high frequency, through its out-of-phase component, can map very poorly conductive units, which may be of structural significance.

b) The low frequency, through its in-phase to out-of-phase ratio can indicate the presence of a highly conductive unit at depth, which may not be as apparent at the high frequency due to the strong effect of a near-surface, poorly-conductive unit being superimposed on the deep highly-conductive unit.

c) The comparative σt estimates at two frequencies can lead to a first order estimate of the true "σt", and indicate whether the subsequent use of the two additional system frequencies is warranted to get a more accurate estimate.

d) The comparative depth estimates at two frequencies can lead to a first order estimate of the "true" depth, and indicate whether the subsequent use of the two additional system frequencies is warranted to get a more accurate estimate.

e) The results at one frequency serve to monitor inevitable reading or recording errors at the other.

f) Inevitable coil-control errors, computational or otherwise, are pointed out by identical effects on the in-phase readings at both frequencies. Identically unusual in-phase readings are often traced back to an error in the coil-control computations.

The use of a second frequency adds only about 15 to 20% to the overall survey time, because a large percentage of the overall time is spent in travelling to and from the property, and in walking from station to station.

Although two frequencies are normally used in reconnaissance surveys, three were used over the Main Showing grid and over most of the Fumarole grid. This move was related mostly to the operating logistics, wherein two lines did not require a full day to cover at two frequencies, but there was insufficient time left to make a significant start on the third line considering that the reference cable was collected at the end of each day and layed out again at the beginning of the following day. The use of a third frequency made for a full day of operation on two lines. At the same time, it served as a hedge against the need to return for additional detailing of deep massive sulphide zones. In other words, three frequencies will suffice in most cases to make near-true σt and depth estimates on deep massive sulphide zones.

The three frequencies used on the Tan grids are 444, 888 and 1777 Hz.

OPTIMUM LINE AND STATION SPACINGS

With a five-station system coil spacing (about 600 ft or 183 m) on a steep slope, the MaxMin II system has a side-looking range of nearly 200 ft or 60 m for long conductive zones striking perpendicular to the traverse line, and nearly 400 ft or 120 m for long conductive zones striking parallel to the traverse line. For short conductive zones, e.g. strike-length 300 ft or 91 m, the side-looking figures become approximately 130 ft (40 m) and 200 ft (60 m) respectively.

Bearing the above-listed figures in mind, it is safe to say that there is no advantage in the reconnaissance stage of a survey to "run" lines which are closer together than 400 ft, when using a large system coil spacing. In other words, it would not be possible to miss a sulphide zone of significant size by operating on a reconnaissance grid with a 400 ft (120 m) line spacing. In the detailing stage, over a short-strike-length conductor, a smaller line spacing would be advantageous.

For the reasons just stated, every second line was "run" during the reconnaissance MaxMin II pass over the Fumarole and Main Showing grids, i.e. lines 8S, 12S, 16S, 20S 24S, 28S, 32S 36S 40S, and 44S on the Fumarole grid, and lines 2E and 6E on the Main Showing grid.

An additional line, L-38S, was run on the Fumarole grid for the reason of getting an exact EM tie with some anomalous IP and geochem results.

With a five-station system coil spacing, readings at every station provide enough data to get an accurate profile shape over any conductor configuration.

PRESENTATION OF RESULTS

The MaxMin II profiles, topographic profiles, and the interpreted conductor picture for each line are plotted on special sheets. Reduced-scale copies of these sheets are bound with a "legend" sheet toward the end of the report. Immediately preceding the profiles of the field results is a set of scaled-modelling-based profiles over a deep massive sulphide zone. The latter profiles have already been referred to in the earlier sections.

Plan maps showing the grid lines, topographic contours, and interpreted conductive zones for the Fumarole and Main Showing grids, are included in the pocket at the end of the report.

INTERPRETATION OF RESULTS

There is no sign of massive sulphide zones (nearly-pure sphalerite notwithstanding) visible in the results for either the Fumarole or the Main Showing grids. This statement is based on the complete absence of anomalous in-phase results beyond the normal noise-envelope of $\pm 1\frac{1}{2}\%$.

However, there are weakly conductive zones present on both the Fumarole and Main Showing grids. These zones are shown on both the profile sheets and on the plan maps. For the Fumarole grid, the zones are listed "A" to "H". They are listed "A" and "B" for the Main Showing grid.

The dips of the conductive zones, shown on the profile sheets, are only approximate. However, they are probably within 20° of the actual dips.

These weakly conductive zones are no doubt structurally related, paralleling and sub-paralleling the topographic contours across the two grids. However, in view of σt values of only a small fraction of 1 mho, it is not possible for these conductive zones to consist of even loosely interconnected veinlets of sulphides (pure sphalerite excluded). It is thought that the conductivity in these zones is due to water-filled pores and fractures in pyritized volcanic tuff units. The water is sufficiently ionized through contact with the pyrite to become EM sensitive.

There is some evidence in the results, of very weakly conductive material between some of the plotted zones, on both grids. But, no indication of this is made on either the plans or sections, because it is very difficult to resolve with certainty.

The IP anomalies on both grids are no doubt related to the MaxMin II EM anomalies; although, the IP system is seeing disseminated sulphides beyond the fractured water-bearing parts of the pyritized tuffs. However, there is a very obvious relationship between the IP anomaly on Fumarole lines 40S to 36S and conductor "D", and the IP anomaly on Fumarole lines 20S and 16S and conductor E. In fact, the width of the first-mentioned IP anomaly suggests that conductors E and C_1 are at the upper and lower boundary of the wide polarizable unit, and conductor D is within the unit. Similarly, on the Main Showing grid, it appears that conductors A and B are at the upper and lower boundary of a wide polarizable unit.

CONCLUDING REMARKS

Following on-site discussions with the Norcen geologists, two drill holes were decided upon, prior to the writer's leaving the area. The first hole was spotted around 11+00W on L-38S on the Fumarole grid, and the second was spotted around 5+00S on L-4E on the Main Showing grid.

By drilling the Fumarole hole at -90° to -80°E for at least 700 ft, the entire IP-anomalous unit between conductors E and C, would be investigated. Such a hole would also have an at-depth look at the source of the copper and zinc geochemical anomalies in the area.

By drilling the Main Showing hole at -90° to -70°N for 400 to 500 ft, the entire IP-anomalous unit between conductors A and B would be investigated. Such a hole would also have an at-depth look at the mineralization seen in the trench on the road which crosses the grid.

In keeping with the search-depth figures for the MaxMin II system, listed in the table on page 5, the writer would not expect to see a massive chalcopyrite-rich sulphide zone of significant size (600 ft x 1200ft) intersected above a depth of 350 ft in either of these holes. However, the possibility exists below this depth.

WRITER'S DECLARATION

I have no financial interest in the Tan claim group.

I hold BA and MA degrees in geophysics from the University of Toronto. I have worked full time in mining exploration geophysics since 1953, and two summer seasons prior to 1953.

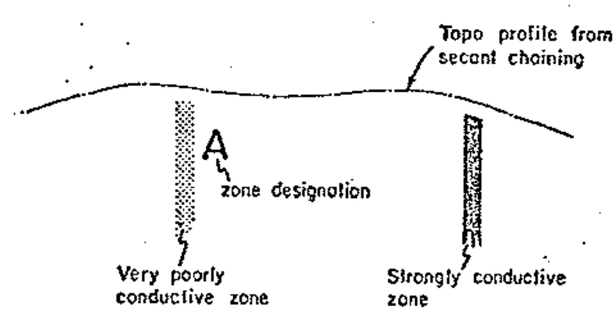
All statements made in this report are correct to the best of my knowledge.

REGISTERED PROFESSIONAL ENGINEER
J. E. BETZ
PROVINCE OF ONTARIO

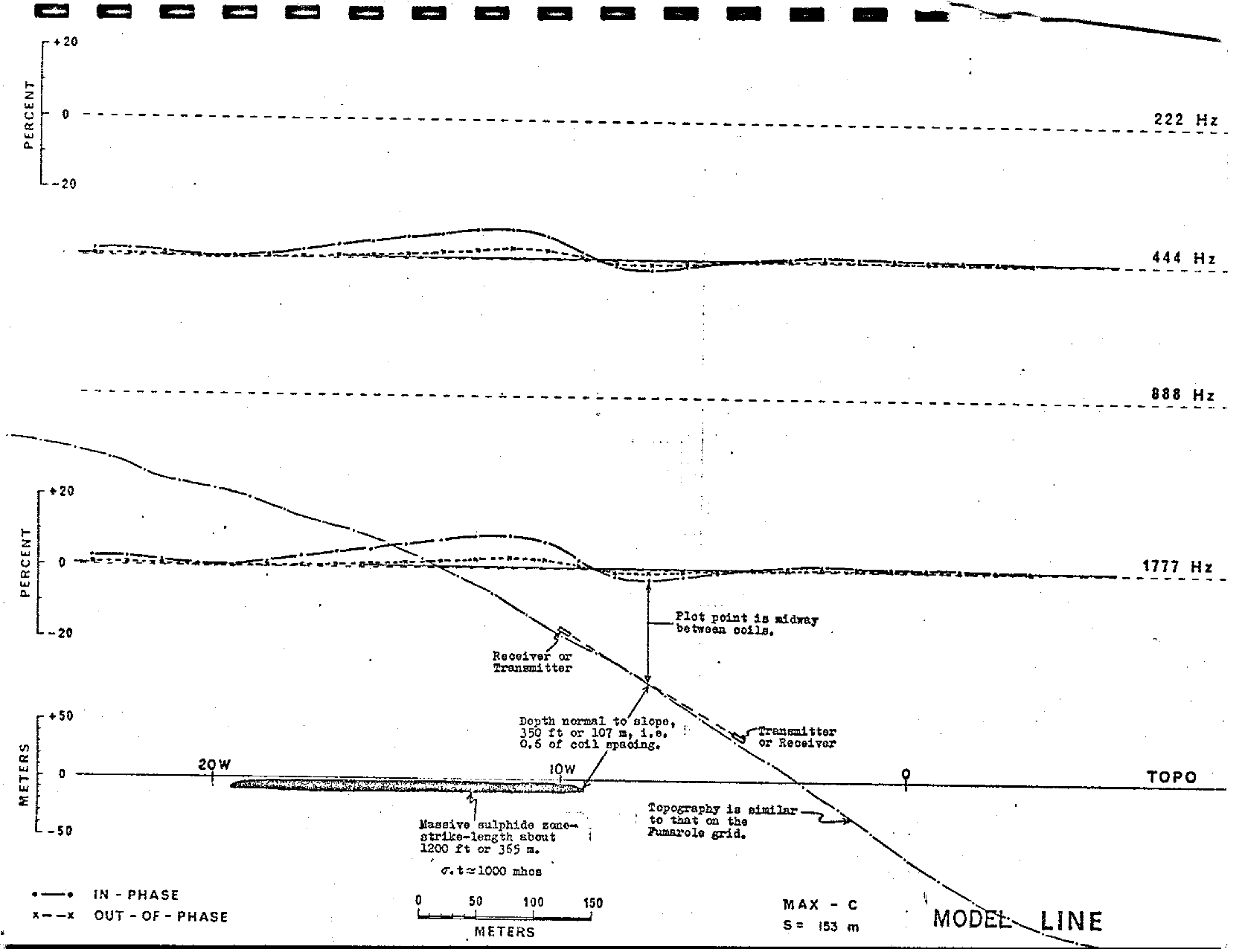
August, 1976
Toronto, Ontario

John E. Betz, M.A., P.Eng. Ont.
John Betz Limited
per John E. Betz, P. Eng.

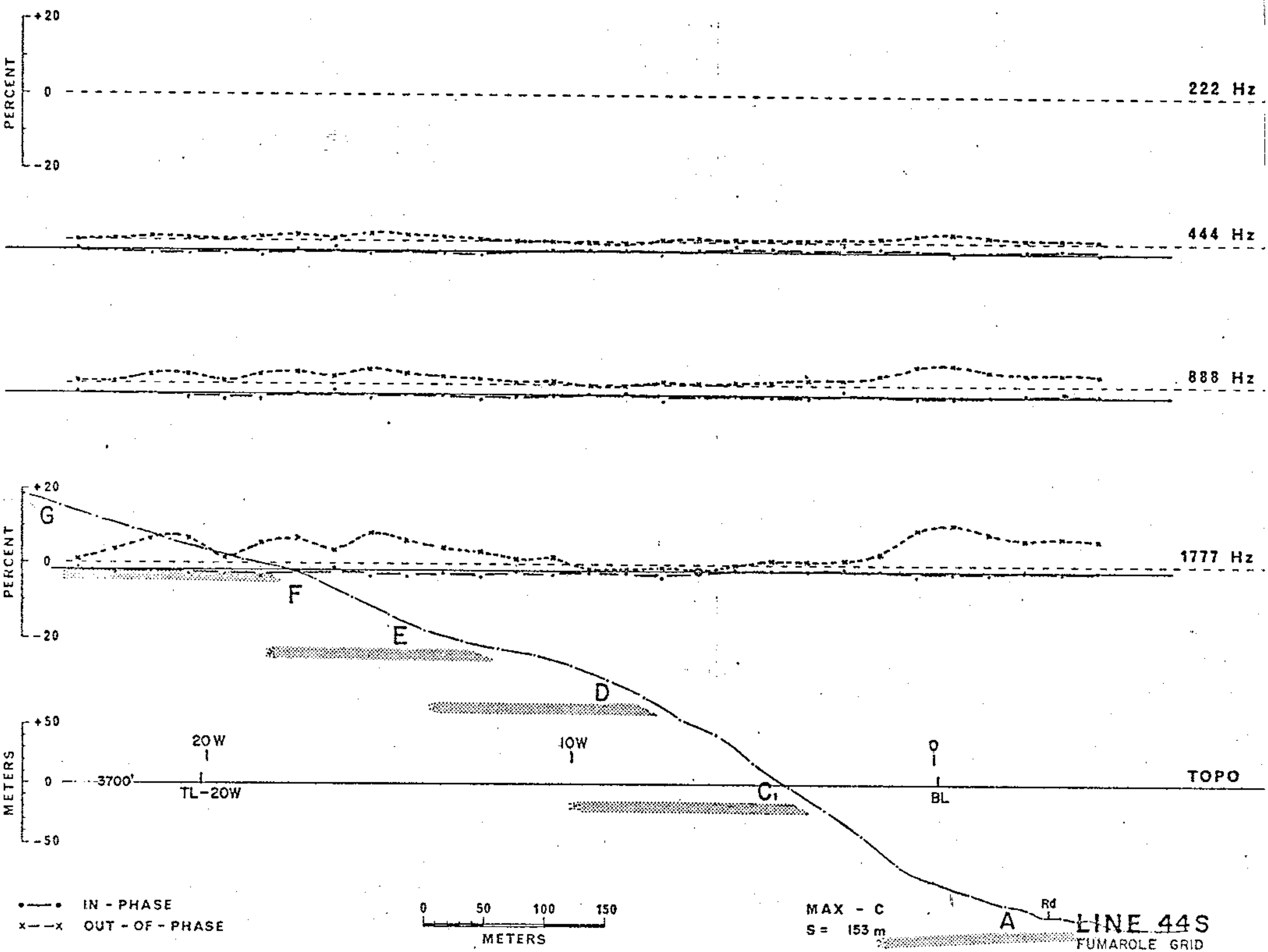
LEGEND FOR PROFILE SHEETS



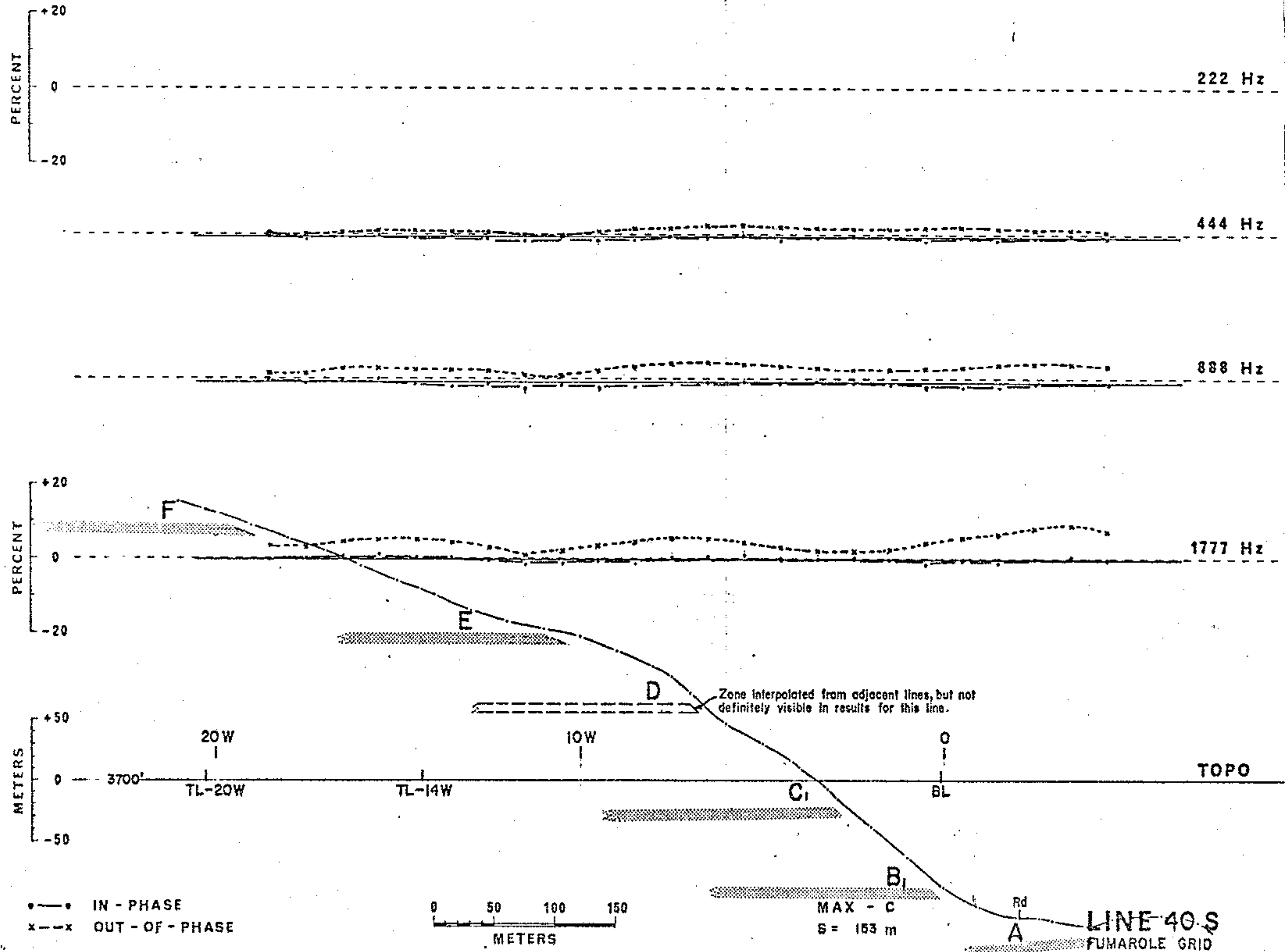
S - system coil spacing, 500 ft or 153 m.
(horizontal plane projection)



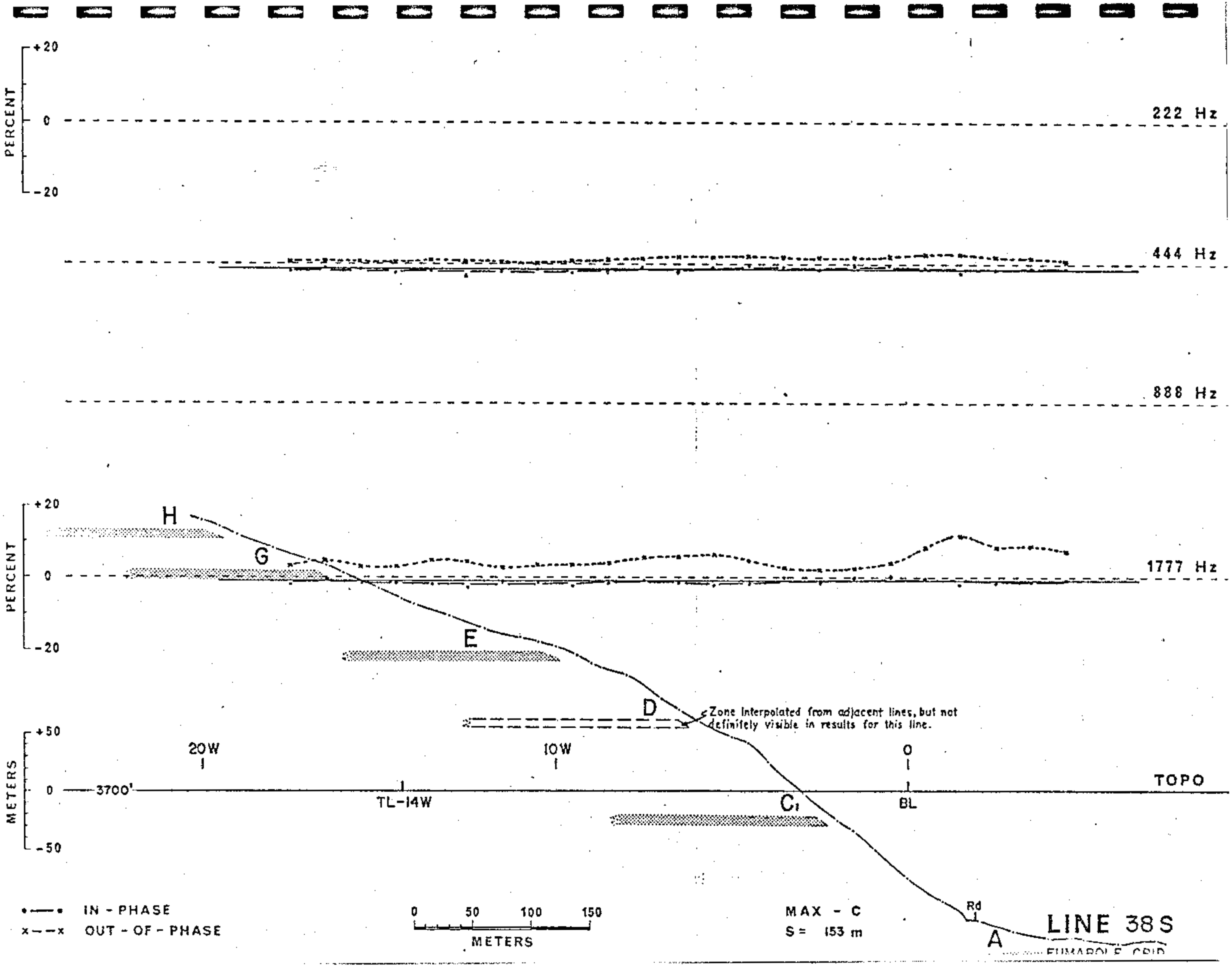
PERCENT
+20
0
-20
222 Hz
444 Hz
888 Hz
PERCENT
+20
0
-20
1777 Hz
Plot point is midway between coils.
Receiver or Transmitter
Depth normal to slope, 350 ft or 107 m, i.e. 0.6 of coil spacing.
Transmitter or Receiver
METERS
+50
0
-50
20W
10W
0
TOPO
Massive sulphide zone-strike-length about 1200 ft or 365 m.
σ.t ≈ 1000 mhos
Topography is similar to that on the Fumarole grid.
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 153 m
MODEL LINE



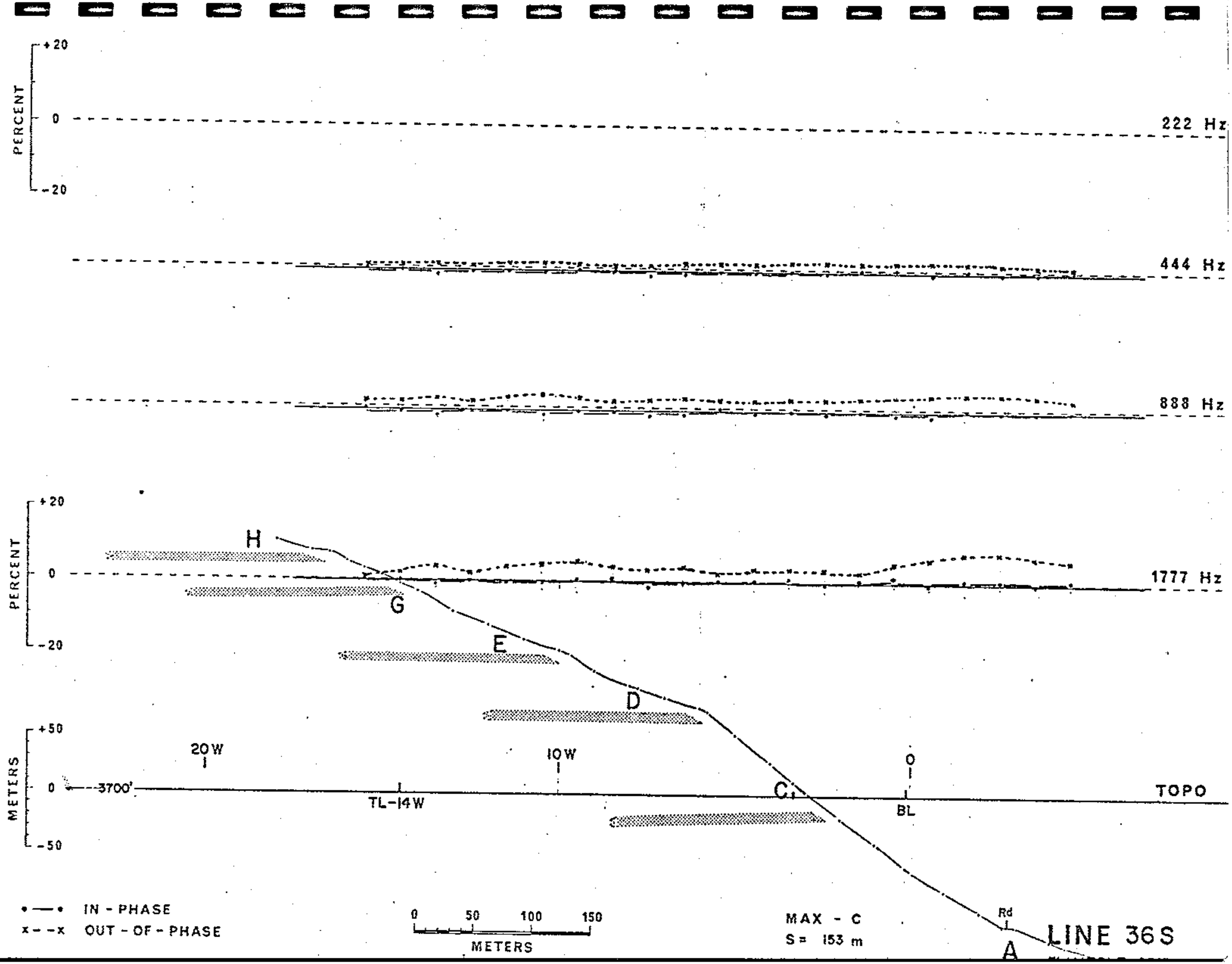
+20
PERCENT
0
-20
222 Hz
444 Hz
888 Hz
+20
G
0
PERCENT
-20
1777 Hz
F
E
D
+50
METERS
0
-50
20W
10W
0
-3700'
TL-20W
C1
BL
TOPO
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MAX - C
S = 153 m
Rd
A
LINE 44S
FUMAROLE GRID



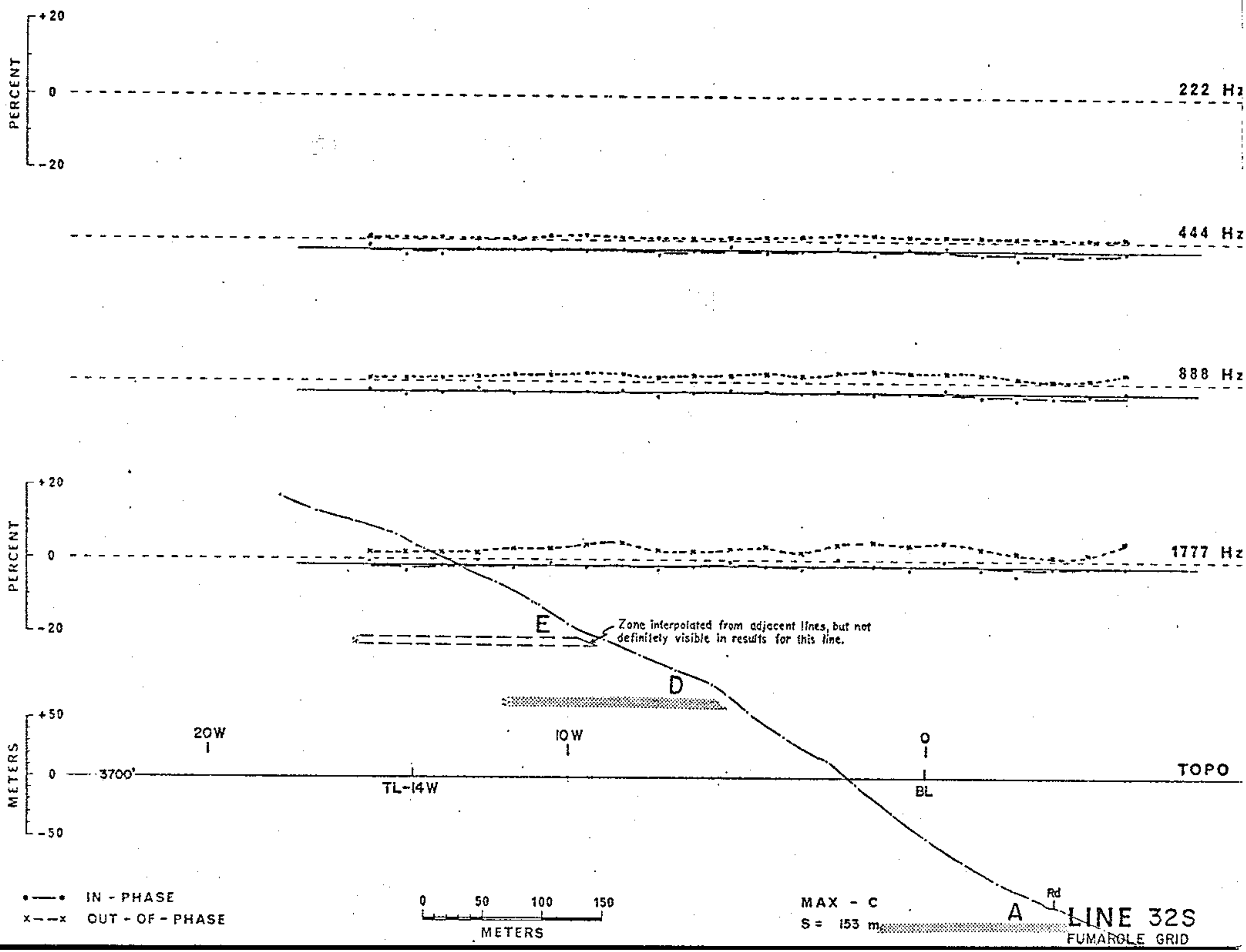
LINE 40 S
FUMAROLE GRID



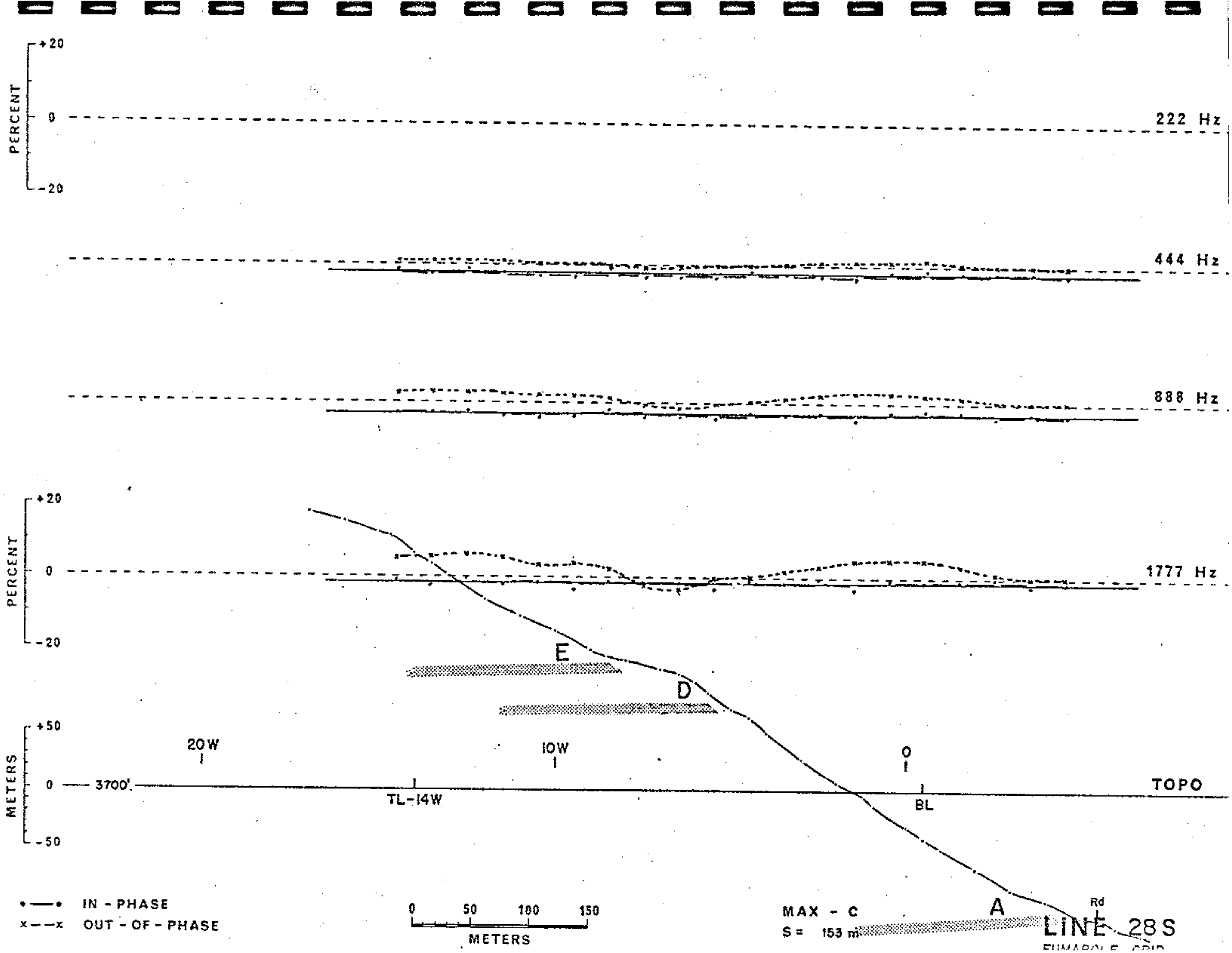
+20
PERCENT
0
-20
222 Hz
444 Hz
888 Hz
+20
PERCENT
0
-20
1777 Hz
H
G
E
D
Zone interpolated from adjacent lines, but not definitely visible in results for this line.
+50
METERS
0
-50
20W
10W
0
3700'
TOPO
TL-14W
BL
C1
Rd
A
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 153 m
LINE 38S
FUMAROLE GRID



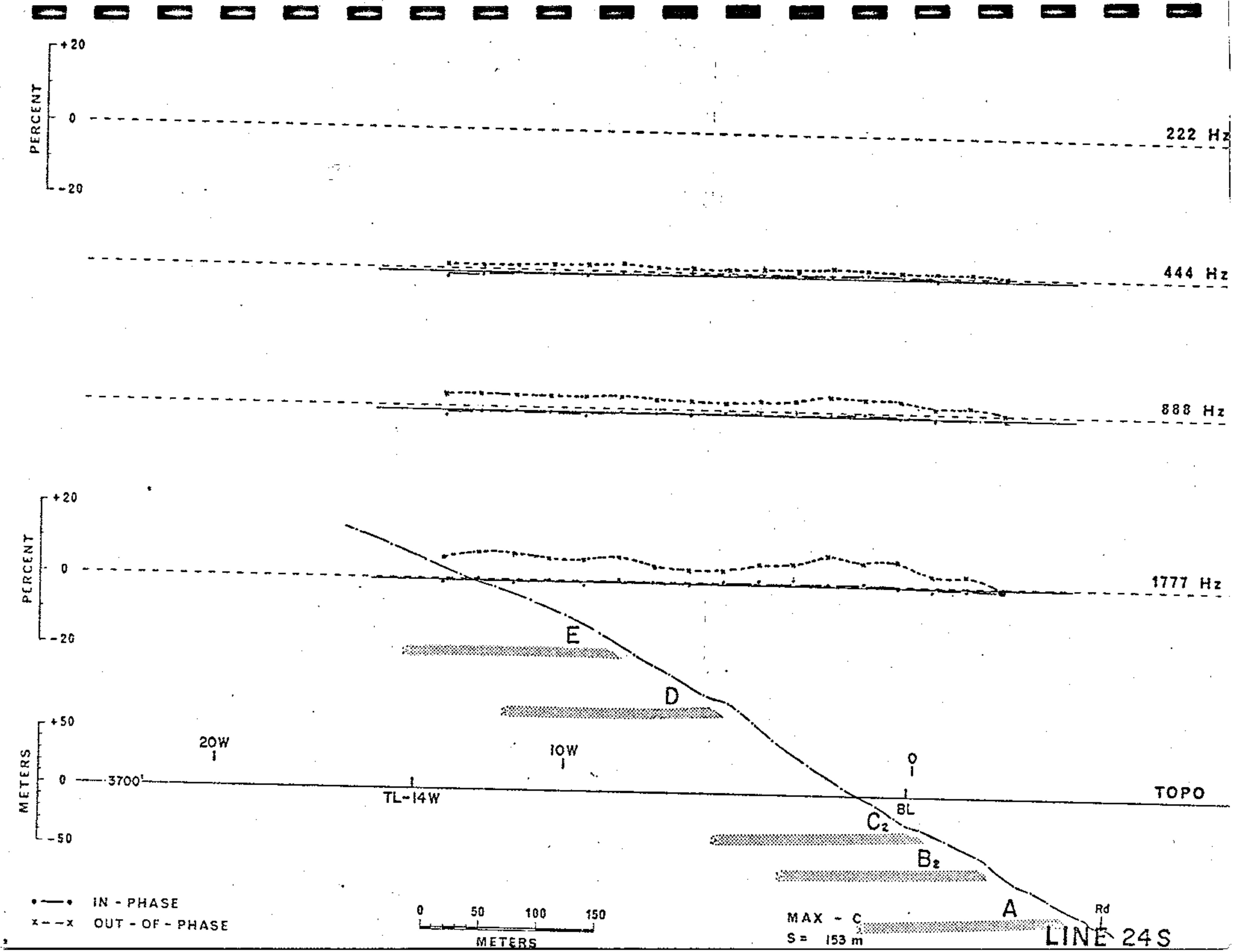
PERCENT
+20
0
-20
222 Hz
444 Hz
888 Hz
1777 Hz
H
G
E
D
C
A
METERS
+50
-50
20W
10W
0
-3700'
TL-14W
BL
TOPO
Rd
• — • IN - PHASE
x - - x OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 153 m
LINE 36S



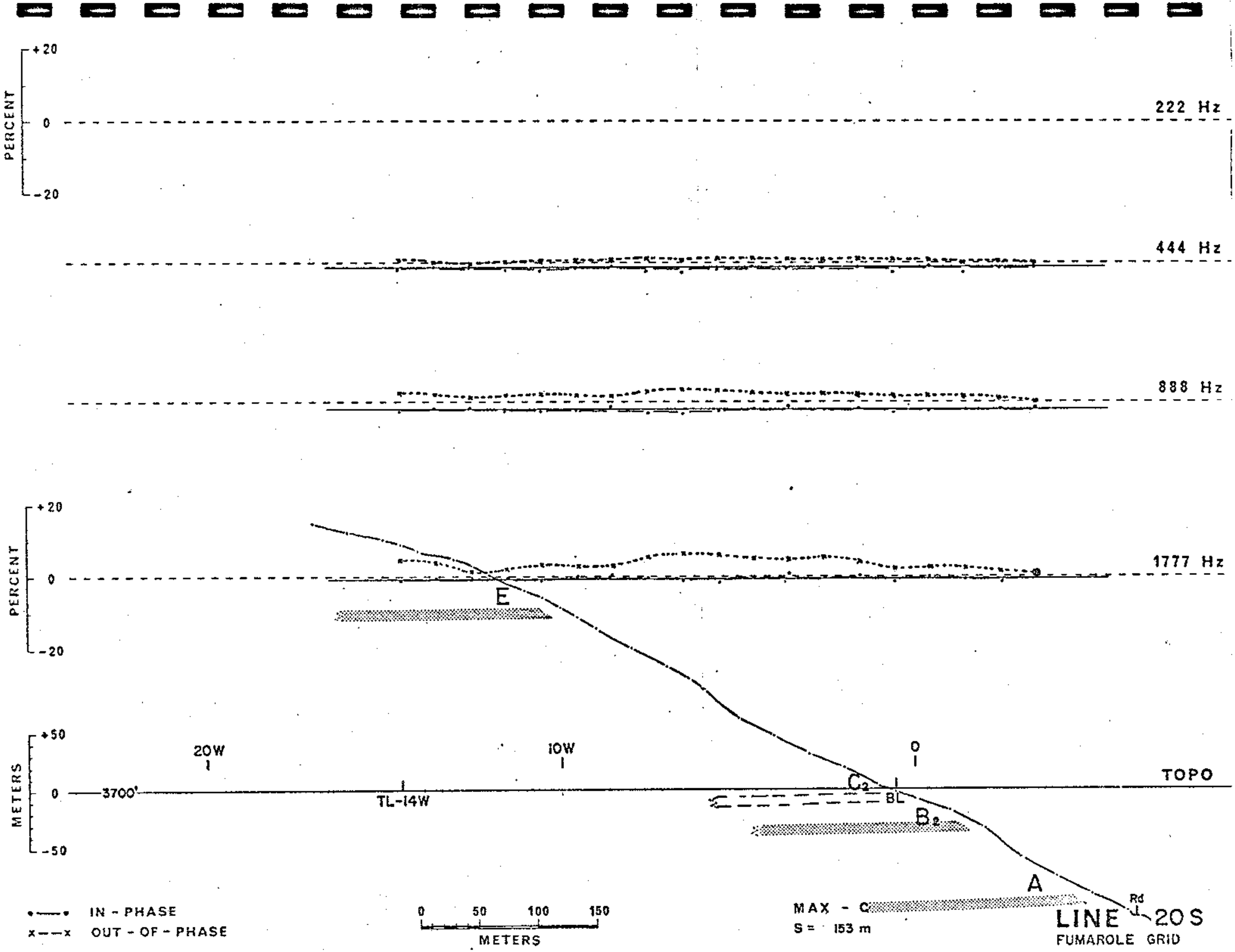
+20
PERCENT
0
-20
222 Hz
444 Hz
888 Hz
+20
PERCENT
0
-20
1777 Hz
E
Zone interpolated from adjacent lines, but not definitely visible in results for this line.
D
+50
METERS
0
-50
20W
10W
0
3700'
TL-14W
BL
TOPO
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MAX - C
S = 153 m
A
Rd
LINE 32S
FUMAROLE GRID



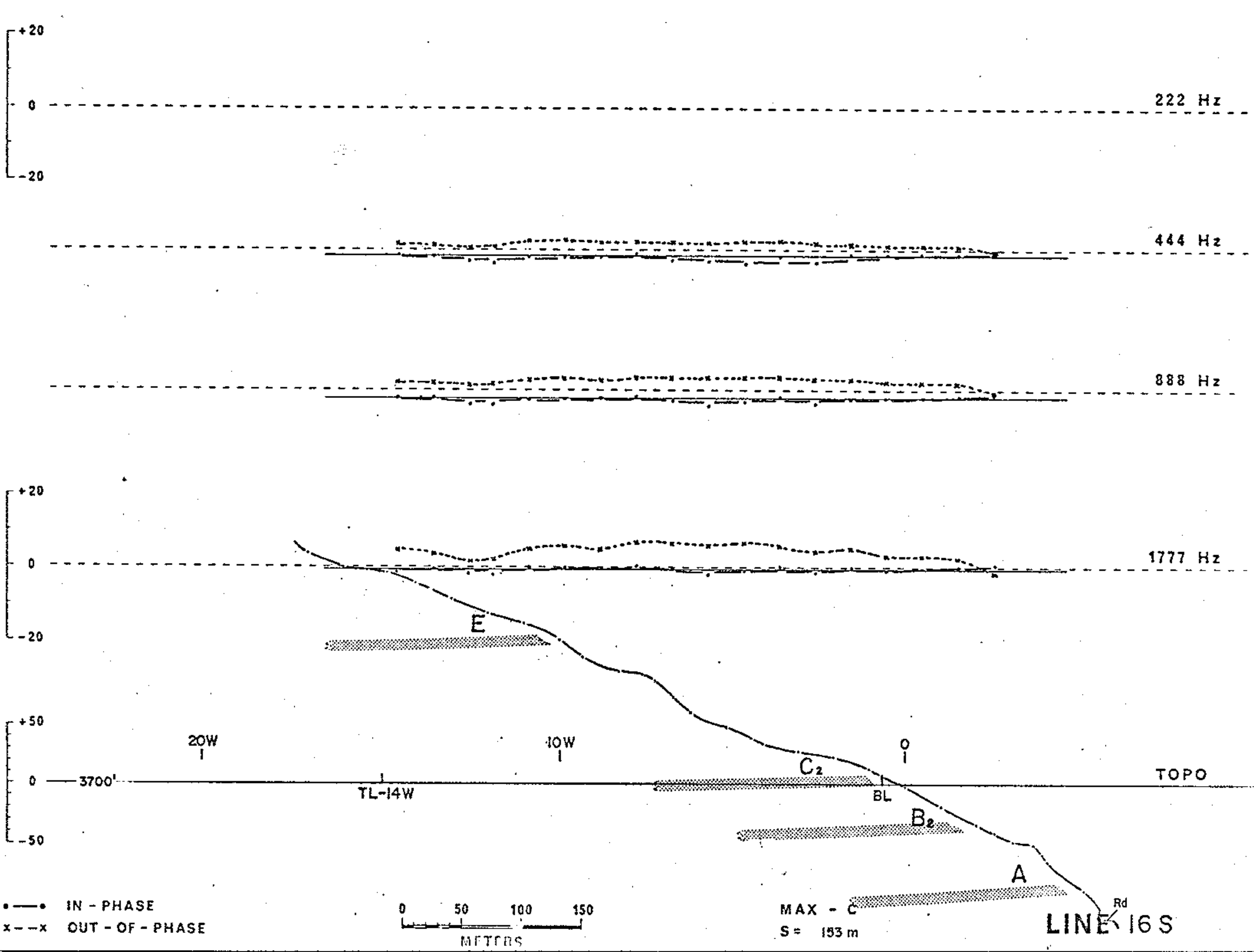
+20
PERCENT
0
-20
222 Hz
444 Hz
888 Hz
+20
PERCENT
0
-20
1777 Hz
E
D
+50
METERS
0
-50
3700'
20W
10W
0
TL-14W
BL
TOPO
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MAX - C
S = 153 m
A
Rd
LINE 28S



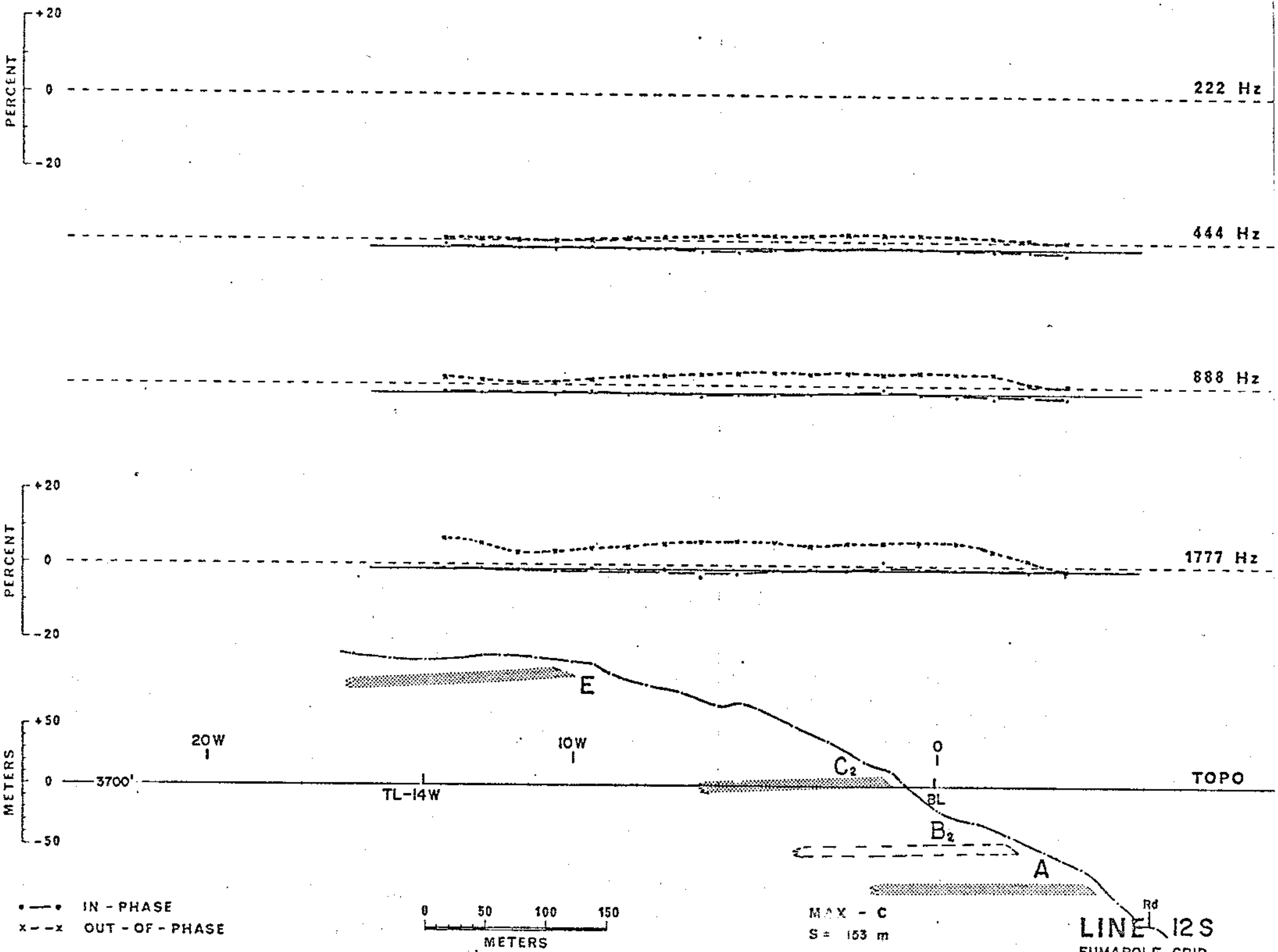
PERCENT
+20
0
-20
222 Hz
444 Hz
888 Hz
1777 Hz
E
D
+50
METERS
0
-50
20W
10W
0
3700'
TL-14W
BL
TOPO
C2
B2
A
Rd
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 153 m
LINE 24S



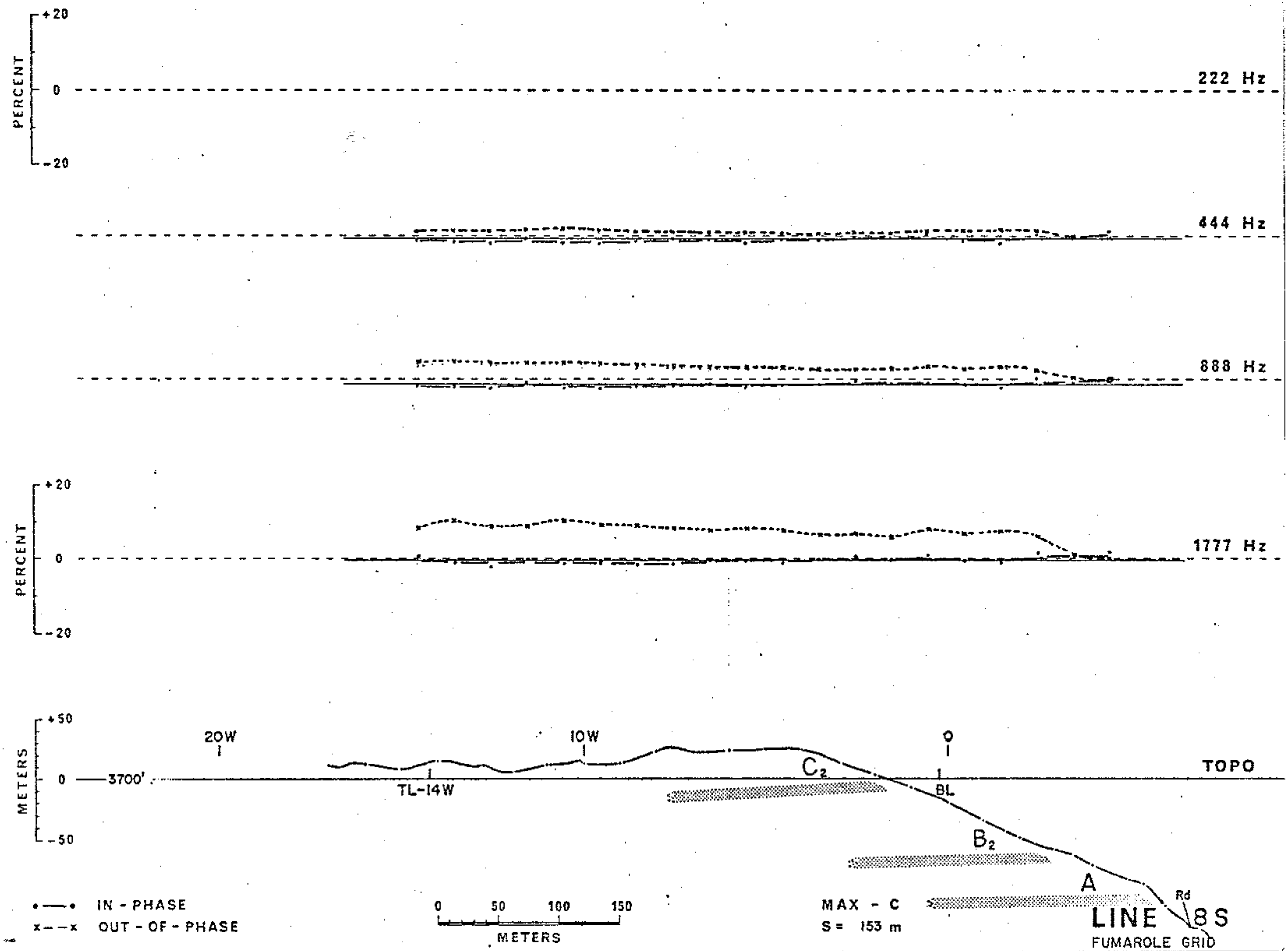
PERCENT
+20
0
-20
222 Hz
444 Hz
888 Hz
1777 Hz
E
METERS
+50
-50
20W
10W
0
TOPO
3700'
TL-14W
C2
BL
B2
A
Rd
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MAX - C
S = 153 m
LINE 20S
FUMAROLE GRID



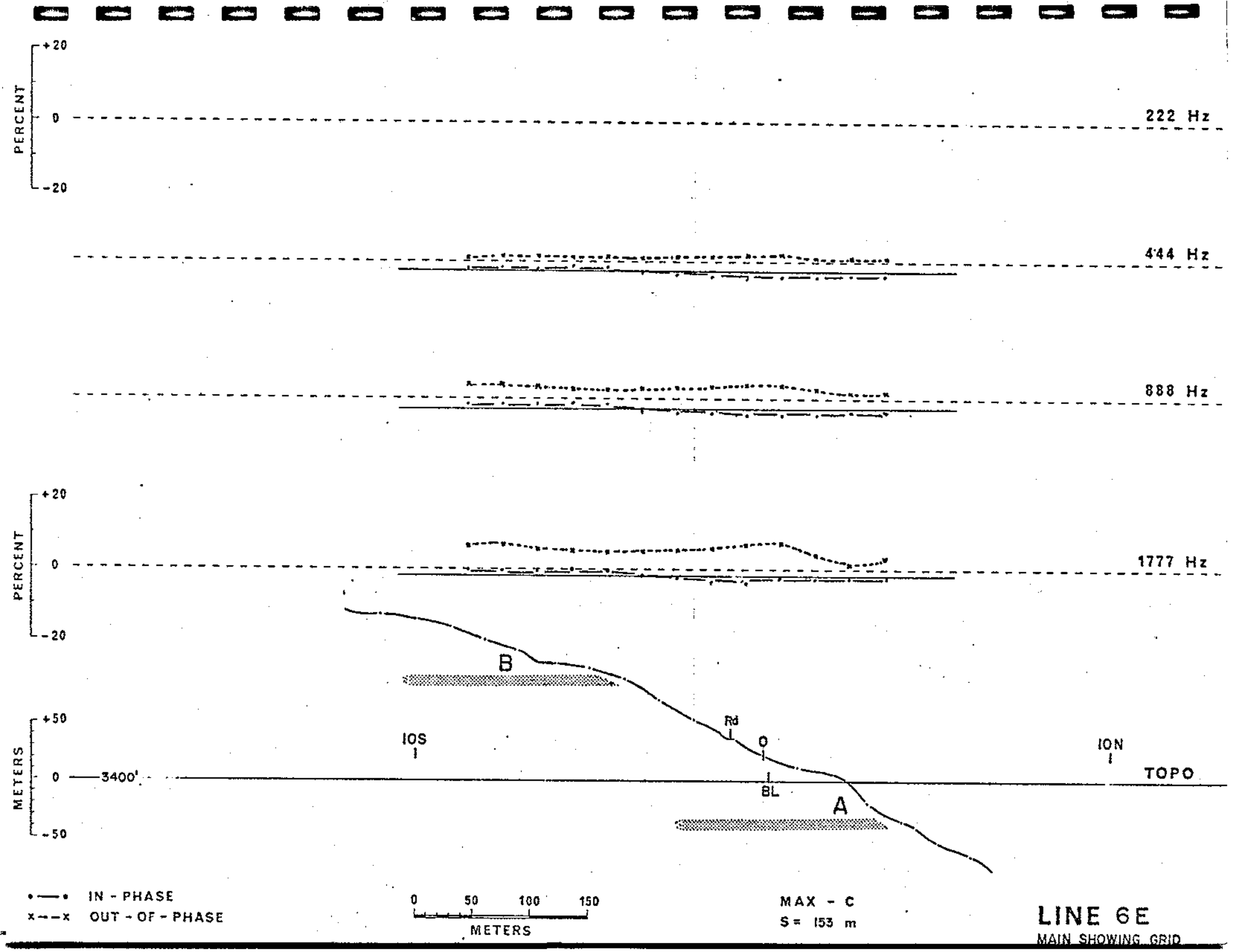
+20
0
-20
222 Hz
444 Hz
888 Hz
+20
0
-20
1777 Hz
E
+50
0
-50
20W
10W
0
3700'
TL-14W
BL
C2
B2
A
TOPO
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 153 m
Rd
LINE 16 S



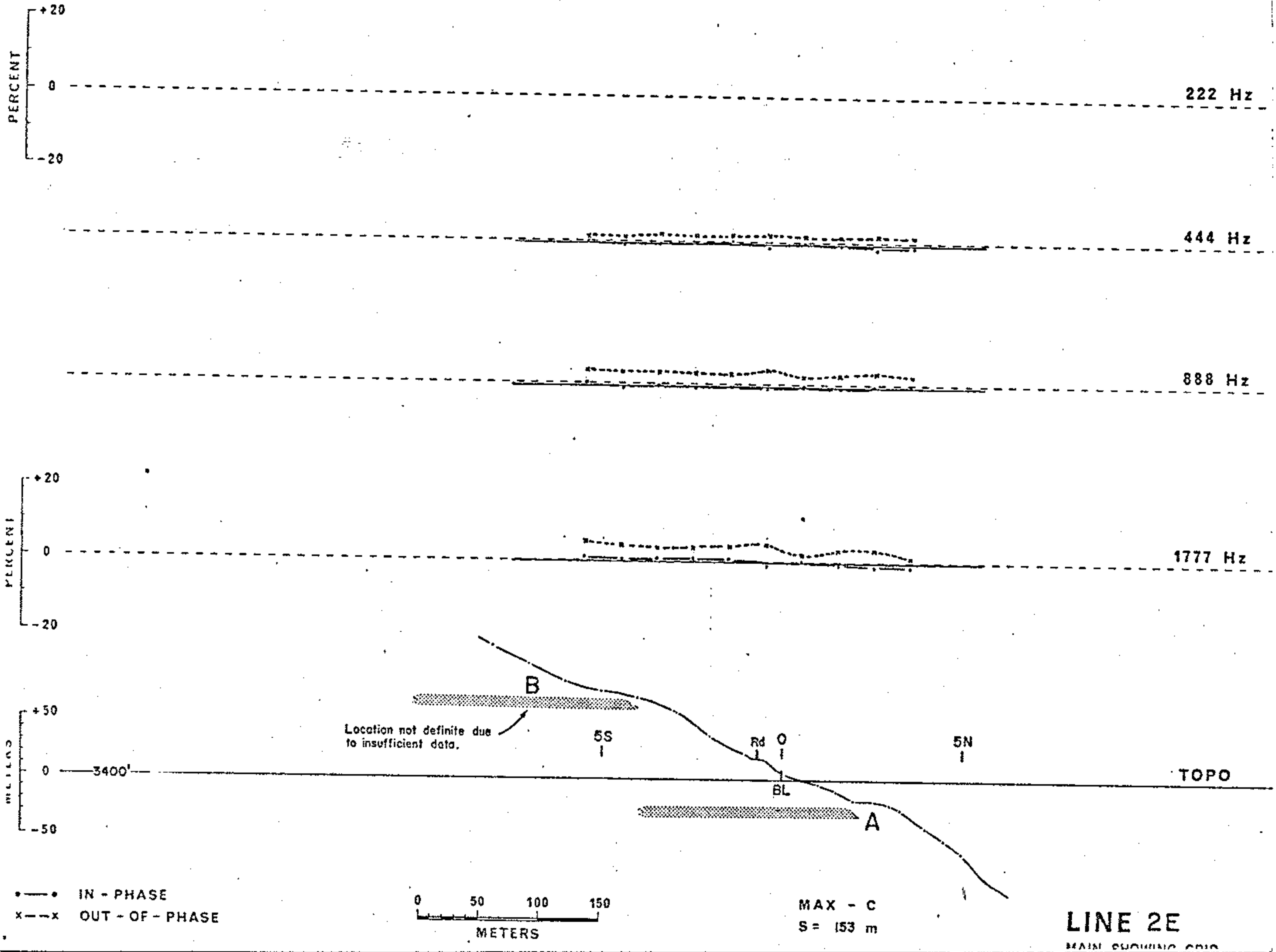
+20
PERCENT
0
-20
222 Hz
444 Hz
888 Hz
+20
PERCENT
0
-20
1777 Hz
E
+50
METERS
0
-50
20W
10W
0
3700'
TL-14W
C2
BL
TOPO
B2
A
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MAX - C
S = 153 m
Rd
LINE 12S
FUMAROLE GRID



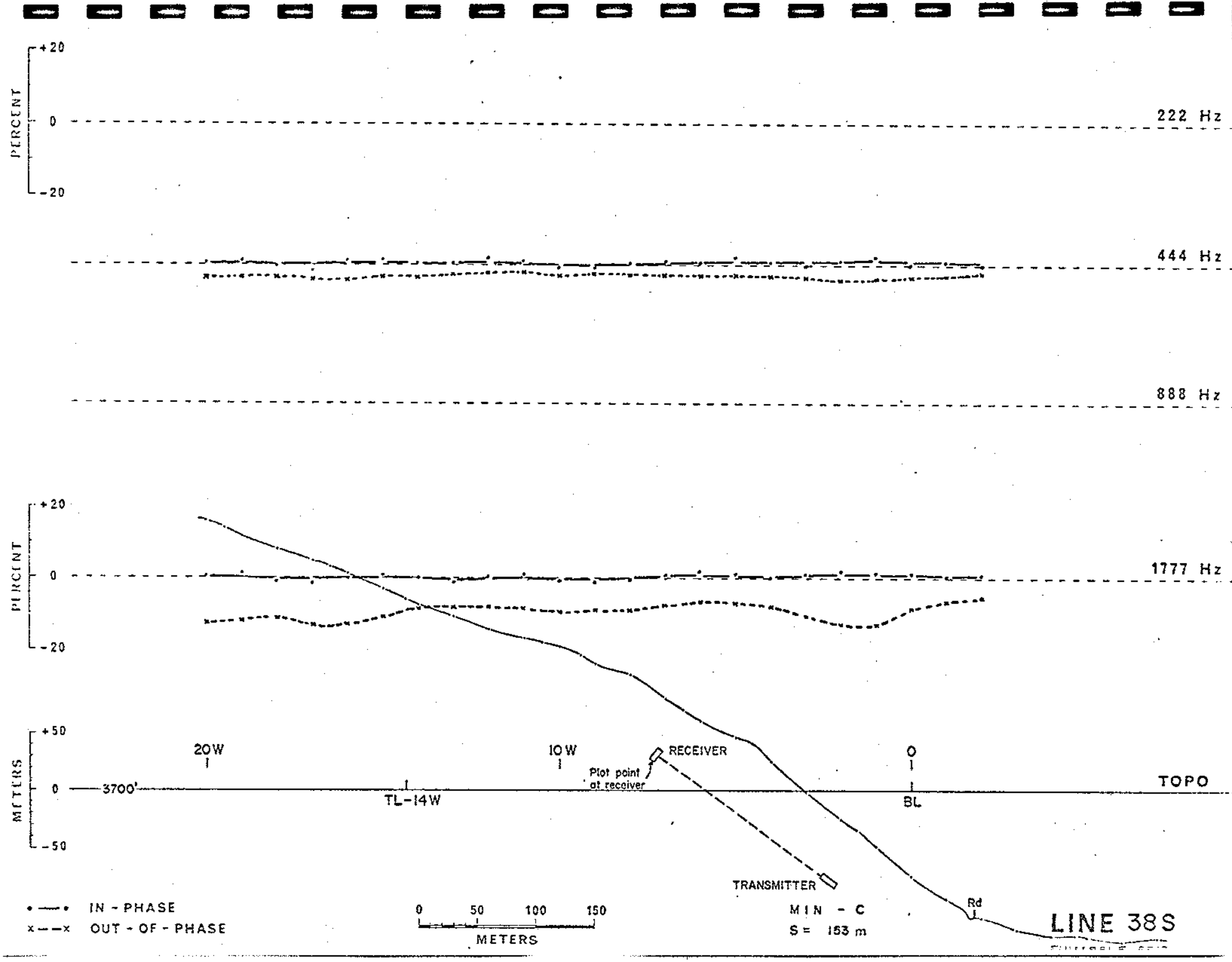
+20
PERCENT
0
-20
222 Hz
444 Hz
888 Hz
+20
PERCENT
0
-20
1777 Hz
+50
METERS
0
-50
3700'
20W
10W
0
TL-14W
BL
TOPO
C2
B2
A
Rd
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MAX - C
S = 153 m
LINE 8 S
FUMAROLE GRID



PERCENT
+20
0
-20
222 Hz
444 Hz
888 Hz
1777 Hz
B
A
METERS
+50
-50
3400'
IOS
Rd
O
BL
ION
TOPO
IN - PHASE
OUT - OF - PHASE
0 50 100 150
METERS
MAX - C
S = 153 m
LINE 6E
MAIN SHOWING GRID



PERCENT
+20
0
-20
222 Hz
444 Hz
888 Hz
PERCENT
+20
0
-20
1777 Hz
B
Location not definite due to insufficient data.
5S
Rd
O
5N
METERS
+50
0
-50
3400'
TOPO
BL
A
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MAX - C
S = 153 m
LINE 2E



+20
PERCENT
0
-20
222 Hz
444 Hz
888 Hz
+20
PERCENT
0
-20
1777 Hz
+50
METERS
0
-50
20W
10W
RECEIVER
0
Plot point at receiver
3700'
TL-14W
BL
TOPO
TRANSMITTER
Rd
IN - PHASE
OUT - OF - PHASE
0
50
100
150
METERS
MIN - C
S = 153 m
LINE 38S

APPENDIX V

GEOCHEMICAL REPORT by Dr. P. Bradshaw

MEMO FROM: Peter M. D. Bradshaw

TO: Glen Garratt,
Norcen Energy Resources,
48708 Chilliwack L. Road,
R. R. #3,
Sardis, British Columbia

Mike McGuinness,
Norcen Energy Resources,
715-5th Ave., S.W.,
Calgary, Alberta

DATE: June 13, 1976

SUBJECT: TAN PROPERTY, SOUTHERN BRITISH COLUMBIA

I spent June 13th on this property looking at the geochemical data to date and discussing the future programme. My general conclusions are as follows:

CONCLUSIONS

1. There does not appear to have been any substantial soil movement in the area apparent from normal downslope creep. Nor does the soil geochemistry appear to have been distorted by seepage anomalies. This is indicated by the fact that the geochemical anomaly fits the geology quite clearly and also there is no particular build up in seepage areas or at breaks in slope. Consequently, the soil geochemistry probably reflects the sub-outcrop of mineralization to within a few hundred feet.

2. The close correspondence between the Zn and Cu soil data indicate that movement is probably largely mechanical.

3. Except for the small alluvial filled area near the headwater of Fumarole Creek, soil sampling should be fairly effective everywhere, provided the effects of downslope creep and land slip are taken into consideration, and no old (or yet unrecognized) landslide has destroyed the geochemistry in any particular section.

4. The soil horizon development where observed, was always quite normal with no undue build up of the A_2 (leached) or A_1 (organic) horizons. Consequently, soil sampling should not encounter any abnormal problems in this regard.

5. The cold 0.5N HCl extraction on stream sediments apparently greatly increased the contrast (anomaly to background ratio) for both Zn and Cu.

RECOMMENDATIONS

1. Within the area of the strongest soil anomalies, and also over significant IP anomalies, soil profile sampling should be used to try and assess the degree of soil creep or displacement of the geochemical anomaly downslope. Samples should be collected from the normal B horizon and then every foot to the greatest depth practical. The samples should be analysed for total Cu and Zn. Close to mineralization the soil profiles should stay about the same or increase with depth; away from mineralization the values should decrease with depth. Alternatively, if an anomaly is covered with barren material, soil profile sampling has the possibility of penetrating this material and indicating any anomaly at depth (as for example, over an IP anomaly). It is important to remember that soil geochemistry will only detect sub-outcropping mineralization (whereas sediment sampling may well indicate blind mineralization).

2. The IP lines should be extended over the alluvial fleet in Fumarole Creek as the soil geochemical anomaly is cut off by this transported material. The banks on the far side of this flat are not anomalous, so the mineralization apparently doesn't reach to the other side.

3. A number of rock geochemical samples should be collected from outcrops and possibly float in the area and analysed geochemically for total Cu and Zn. These should, a) give background data in the different rock types to help interpret the sediment data, b) determine if there is enough Zn/Cu in the outcrop or float to account for the geochemical soil anomalies, or if another source is indicated.

4. From an examination of the sediment data I would suggest the following breakdown for a first pass at interpretation:

	Cu (ppm)	Zn (ppm)
Background	0 - 12	0 - 16
Threshold	12	16
3rd Order Anomalous	13 - 18	17 - 24
2nd Order Anomalous	19 - 24	25 - 32
1st Order Anomalous	>24	>32

These limits may have to be modified slightly in the light of experience, and an open mind should be kept on this point.

5. For sediment anomalous of ambiguous origin, the presence of anomalous Ba would help in indicating a mineralization source. If Ba is used it should also be analysed in the sediments draining known mineralization as well, to act as an orientation.

6. When the helicopter is in the area some time should be spent looking for large old landslides. This would be very hard to recognize from the ground and would obligerate any geochemical soil anomaly or move it down hill.

APPENDIX VI

CREW BREAKDOWN AND CONTRACTORS

APPENDIX VII

STATEMENT OF QUALIFICATIONS

CREW BREAKDOWN AND CONTRACTORS

Party Chief:	G. L. Garratt
Geologists (Mt. McGuire Mapping)	M. Mawer; C. Q. Winter, D. Good, T. Bojczysyn.
Geological Assistants:	C. Cotton, D. Shearer, S. Foriancek.
Property Supervisor:	M. D. McInnis.
Geophysical Surveys:	J. Lloyd - I.P. - Eagle Geophysics, Vancouver; J. Betz - Max-Min II - Toronto.
Diamond Drilling:	Tonto Drilling Co., Vancouver, British Columbia.
Trenching and Blasting:	G. Stapely.
Road Building and Clearing:	Tolson's Heavy Hauling, Sardis, British Columbia.
Linecutting:	Martinson Linecutting and Staking Ltd., Powell River.
Drill Site Clearing:	B. Tolmie.
Geochemical Consultant:	Dr. P. Bradshaw, Barringer Research Ltd., Toronto, Ontario.

STATEMENT OF QUALIFICATIONS

I, Glen L. Garratt, am a qualified Geologist having graduated from the University of British Columbia in 1972 with a Bachelor of Science degree majoring in Geology. I have worked in the mineral exploration industry in British Columbia since 1969 and am presently employed by Great Plains Development Company of Canada, Ltd., as a geologist.

G. L. Garratt
October, 1976

STATEMENT OF QUALIFICATIONS

I, Michael D. McInnis, with residence at 6550 Silver Spring Way, N.W. in the City of Calgary, Alberta, declare

1. that I graduated from the University of British Columbia in 1969 with an Honours B.Sc., in geology,

2. that since graduation I have been employed as an exploration geologist in British Columbia, Yukon and Arctic Islands,

3. that I am presently Exploration Supervisor-Base Metals for Great Plains Development Company of Canada, Ltd.

4. that I have successfully passed the exams necessary for entrance into the Professional Engineers Society of B.C. and have received a non-resident licence from that society.

Michael D. McInnis
P. Eng.
October, 1976

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
M. D. McINNIS

APPENDIX VIII

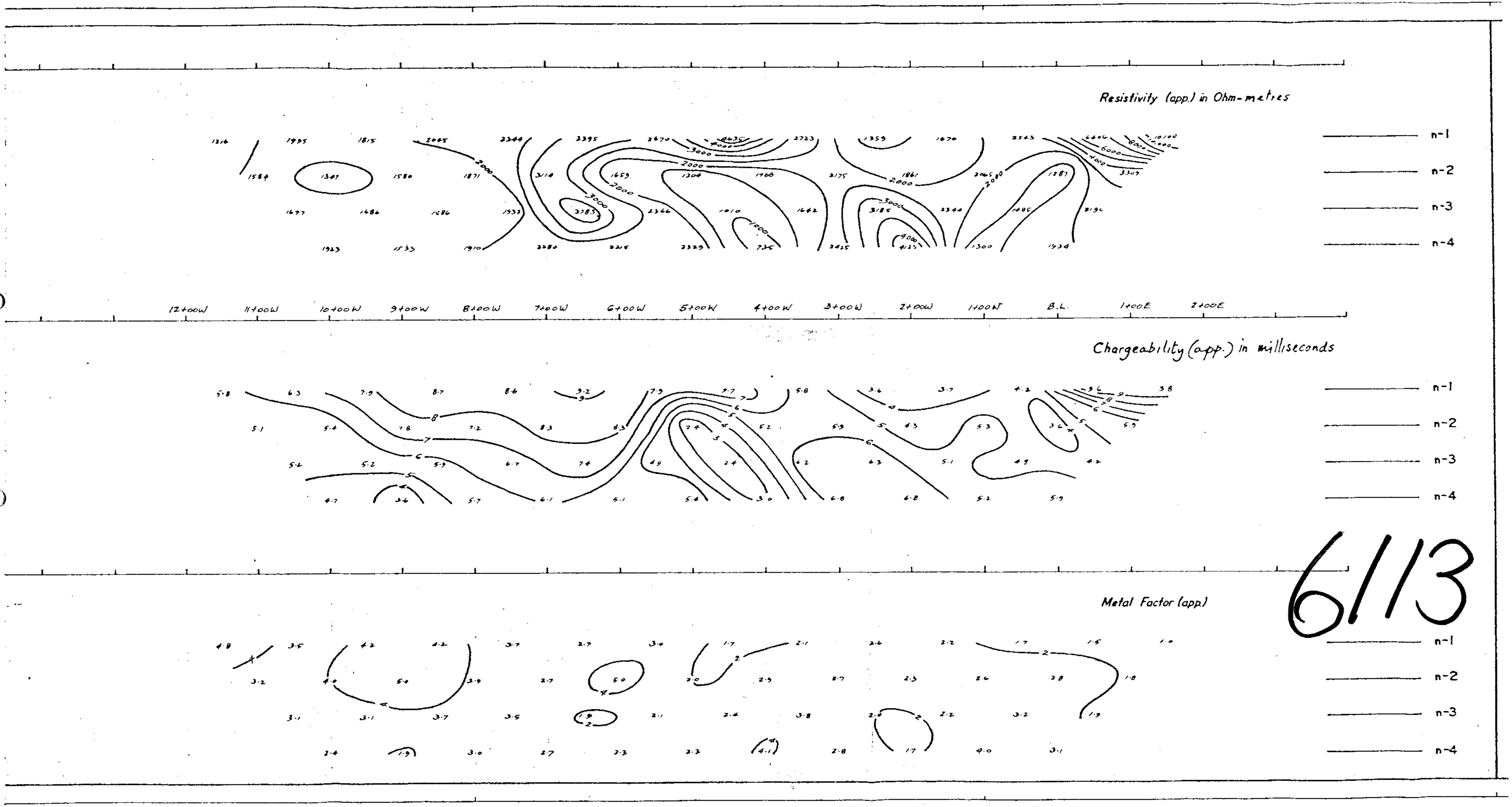
STATEMENT OF EXPENDITURES

APPENDIX VIII: EXPENDITURE STATEMENT:

The following is a summary of expenditures incurred during the exploration program carried out on the Tan claims between May 15 and August 30, 1976.

Salaries:	224 man-days @$50/man/day	$11,222.16
Trenching:	Blaster and equipment	$ 687.34
Linecutting:		$ 2,669.00
Road repair and tree falling		$ 987.50
Geophysical Surveys:	I.P.	$13,039.85
	Max-Min II - EM	$ 4,973.80
Drilling		$21,844.28
Helicopter Charter		$ 6,014.45
Truck rentals and operating costs		$ 2,961.97
Geochemical Analyses		$ 580.00
Camp Supplies		$ 542.31
Room and Board (includes contractors room and board)		$13,286.08
		$78,808.74
	+10% Overhead	$ 7,880.87
	TOTAL EXPENDITURES:	$86,689.61

LINE: 38+00S


Resistivity (app.) in Ohm-metres
n-1
n-2
n-3
n-4
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
Chargeability (app.) in milliseconds
n-1
n-2
n-3
n-4
6113
Metal Factor (app.)
n-1
n-2
n-3
n-4

N

CULTUS FM.

JURRASIC
UPPER TRIASSIC

	13	Volcanic Arenites and Argillites
UPPER SERIES	12	Green Andesite (Calcite – Chlorite Filled Amygdules Minor Hornblende Andesite
	11	Water – Lain Tuffs (Volcanic Arenites) Lithic Tuffs, Acidic to Intermediate Volcanic Breccias
	10	Mineralized – Altered Horizon
	9	Purple and Green Andesitic Volcanic Breccia Submarine Pyroclastic Flow (?) and Andesitic Flow
	Pm	Middle Permian Fusilnid Limestone and Calcarenite
	7	Radiolarion Bearing Red and Green Cherts
	6	Volcanic Breccia (Diverse Fragment Composition)
	5	Red and Green Andesites and Basalts
LOWER SERIES	4	Mixed Series: Acid Tuff Breccia, Acid Lapilli Tuff, Acid Porphyry, Intrusives, Acid Tuff, Minor Basic to Intermediate Flows
	3	Light Green Dacite and Porphyritic Dacite, Intrusive Breccias, Acid Tuff Breccia
	2	Red Dacite (Autogeneous Breccia)
	Pls	Lower Pennsylvanian Crinoidal Limestone

260/25 044 48 Bedding or Primary Flow Structure

Thrust Faults

Normal Faults

Survey Stations

76M50 x Outcrop with sample location indicated

Geological Contact (observed, inferred, postulated)

50 217 Fold Axis – a) syncline
b) anticline with direction and plunges

212 65 Foliation or Schistosity

31 085 Jointing

3067806[2] Claim Post

Road

6113

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

BRITISH COLUMBIA

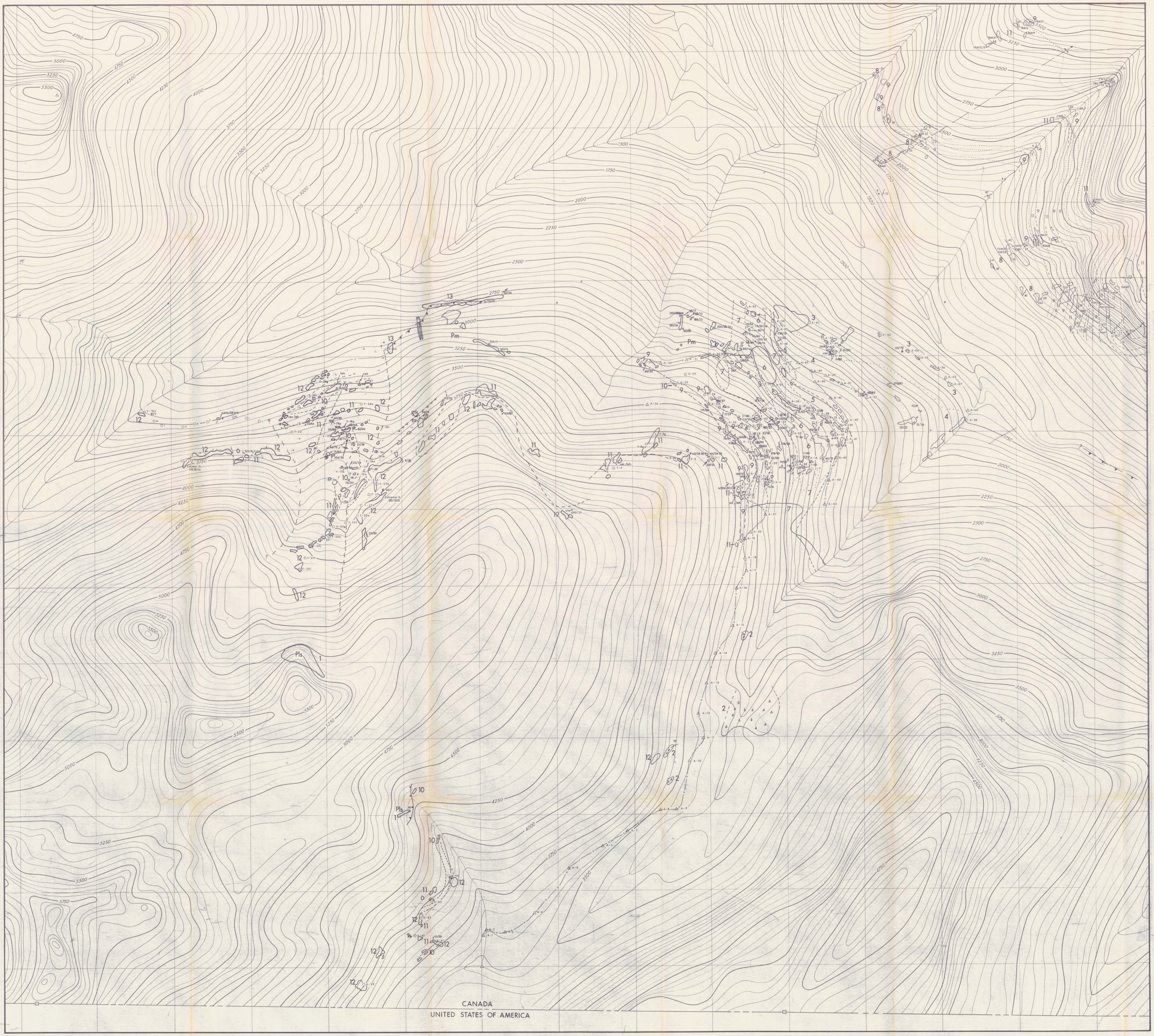
TAN CLAIMS

EAST HALF GEOLOGY

400 200 0 400 800
FEET

NEW WESTMINSTER M.D. | C. WINTER | NTS: 92 H-4 W
G. L. GARRATT | T. BOJCZYSZYN | SEPTEMBER 1976
M. MAWER | D. GOOD

G. L. Garratt.



CULTUS FM.

JURRASIC UPPER TRIASSIC	13	Volcanic Arenites and Argillites
UPPER SERIES	12	Green Andesite (Calcite – Chlorite Filled Amygdules Minor Hornblende Andesite
	11	Water – Lain Tuffs (Volcanic Arenites) Lithic Tuffs, Acidic to Intermediate Volcanic Breccias
	10	Mineralized – Altered Horizon
	9	Purple and Green Andesitic Volcanic Breccia Submarine Pyroclastic Flow (?) and Andesitic Flow
	Pm	Middle Permian Fusilnid Limestone and Calcarenite
	7	Radiolarion Bearing Red and Green Cherts
	6	Volcanic Breccia (Diverse Fragment Composition)
	5	Red and Green Andesites and Basalts
LOWER SERIES	4	Mixed Series: Acid Tuff Breccia, Acid Lapilli Tuff, Acid Porphyry, Intrusives, Acid Tuff, Minor Basic to Intermediate Flows
	3	Light Green Dacite and Porphyritic Dacite, Intrusive Breccias, Acid Tuff Breccia
	2	Red Dacite (Autogeneous Breccia)
	Pls	Lower Pennsylvanian Crinoidal Limestone

260/25 044 48 Bedding or Primary Flow Structure

Thrust Faults

Normal Faults

Survey Stations

76M50 x Outcrop with sample location indicated

Geological Contact (observed, inferred, postulated)

50 217 Fold Axis – a) syncline
b) anticline with direction and plunges

212 65 Foliation or Schistosity

31 085 Jointing

3067806[2] Claim Post

Road

6113

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 2

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.
BRITISH COLUMBIA

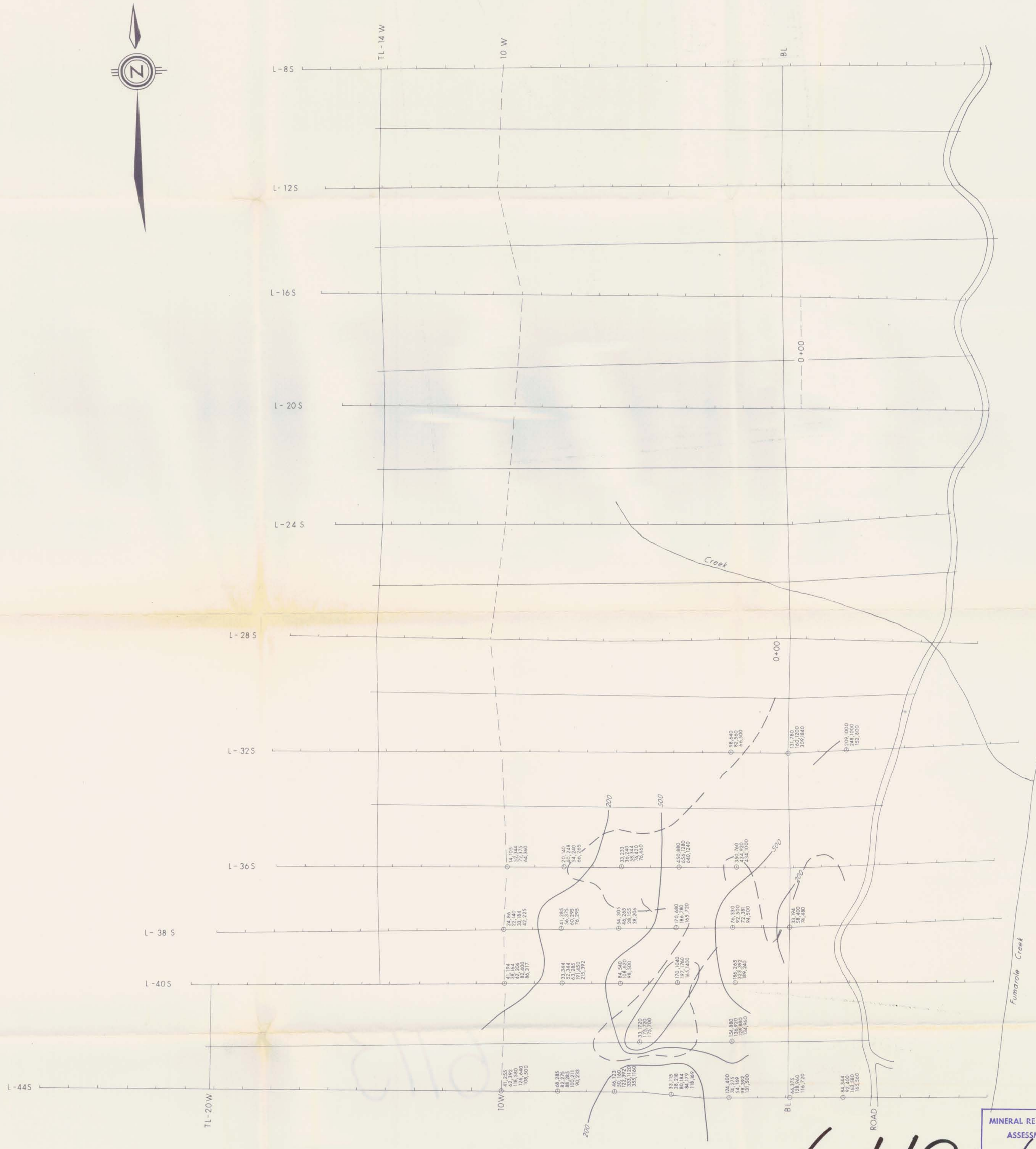
TAN CLAIMS

WEST HALF GEOLOGY

400 200 0 400 800
FEET

NEW WESTMINSTER M.D.
G. L. GARRATT
M. MAWER

NTS: 92 H-4 W
SEPTEMBER 1976



LEGEND

┴┴	Grid Line (stations)	o	Soil Profile Sample Site
═	Road	90, 360 120, 400 160, 420	Cu, Zn values (ppm) (samples at 1 ft vert. intervals)
—	Creek	⌒	Zn contours for top sample
-----	Pseudo Tie Line	⁄ ⌒ —	200 ppm Zn contour from 1975 soil sampling results

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 3

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

TAN CLAIMS – FUMAROLE CREEK GRID
SOIL PROFILE RESULTS

200 0 200 400 FEET
50 0 50 100 METERS

NTS: 92 H /4W
NEW WESTMINSTER M.D.

SEPTEMBER 1976

6113

LEGEND

- Grid Line (stations)
- Road
- Creek
- Pseudo Tie Line
- 76-G-200 Soil Profile Site and Sample Numbers
- Diamond Drill Hole Location

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

TAN CLAIMS – FUMAROLE CREEK GRID

SOIL PROFILE LOCATIONS

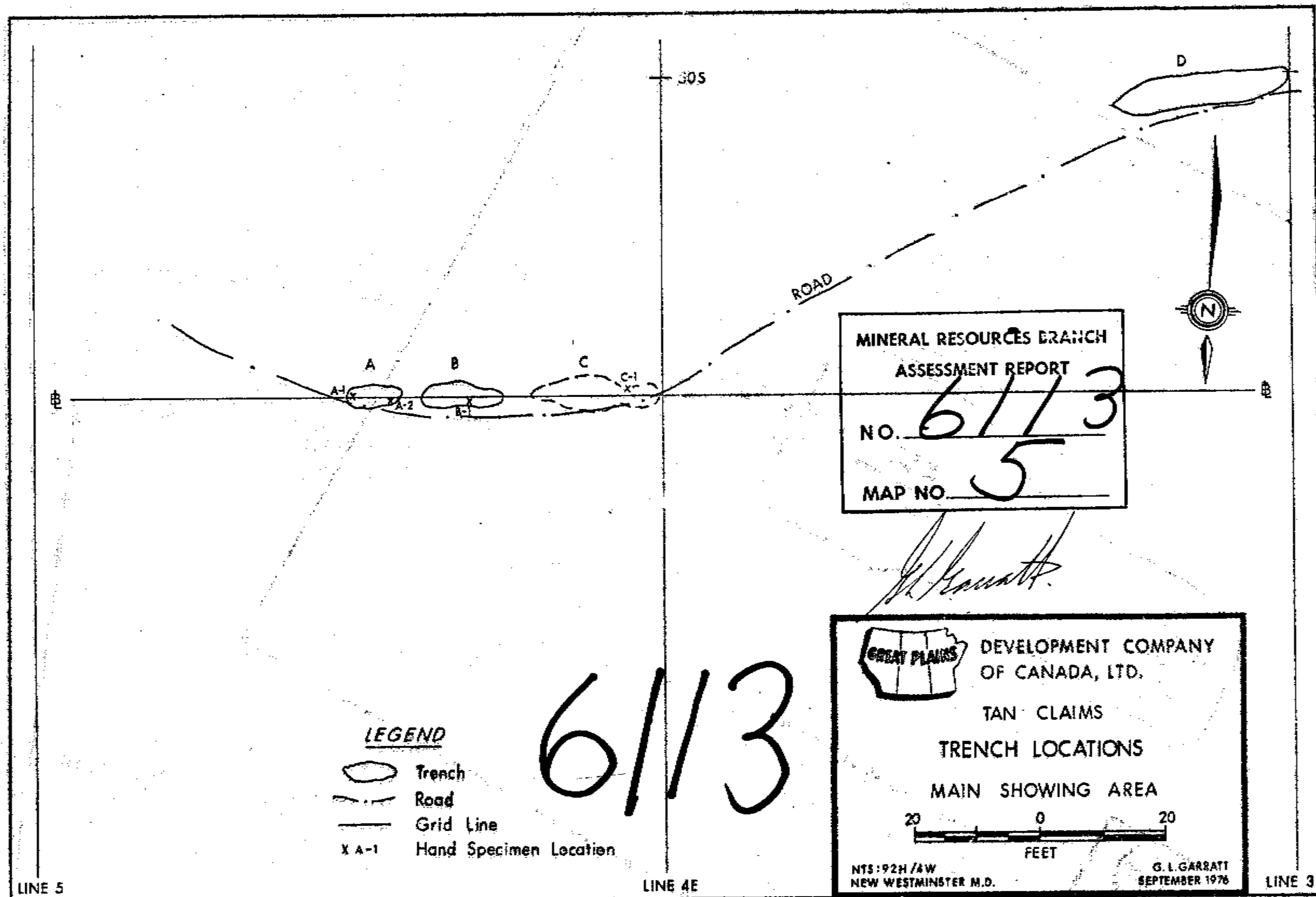
200 0 200 400 FEET

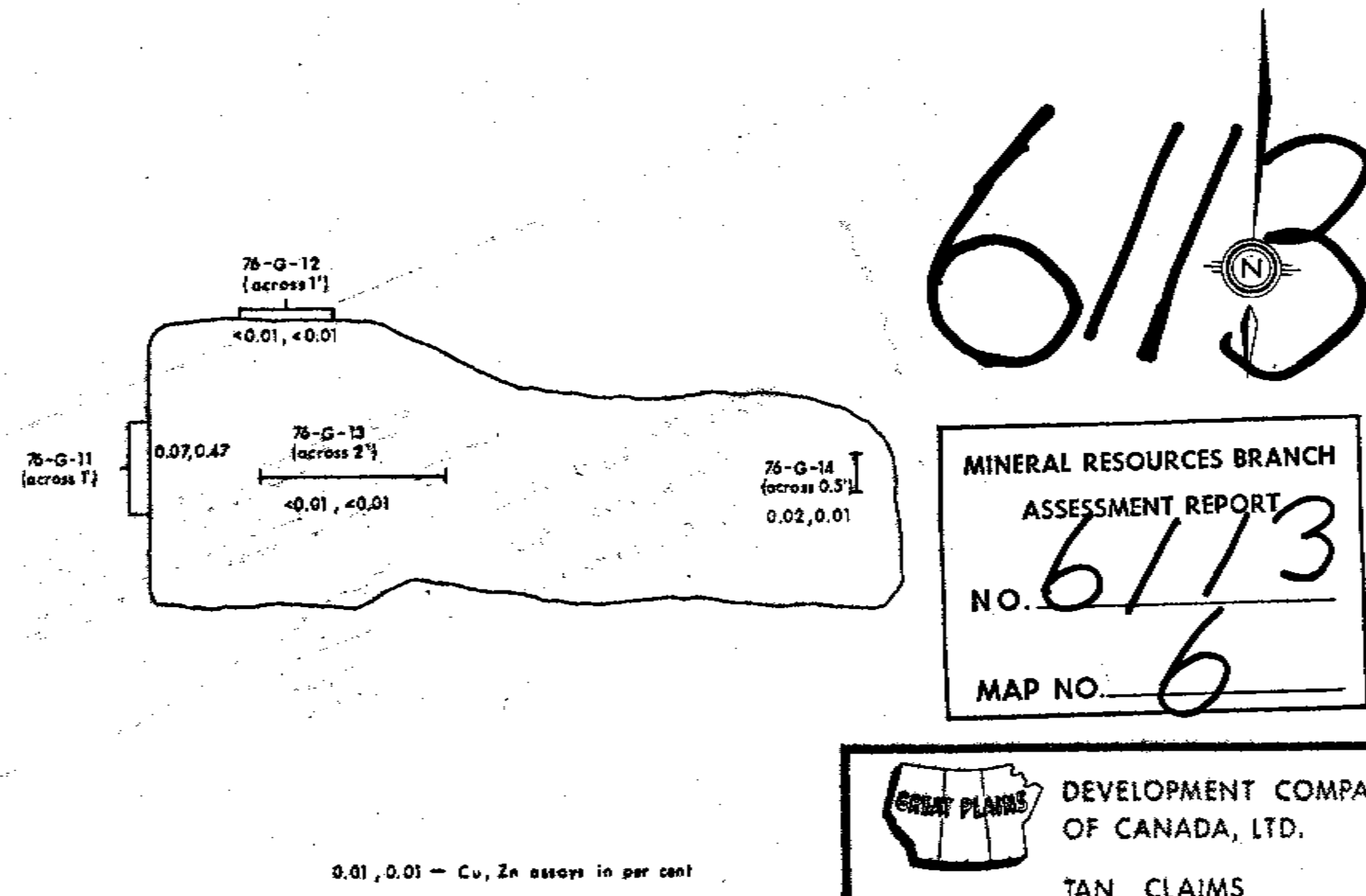
50 0 50 100 METERS

NTS: 92 H/4W

NEW WESTMINSTER M.D.

SEPTEMBER 1976


D
50S
ROAD
A
B
C
A-1
A-2
B-1
C-1
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 5
LEGEND
Trench
Road
Grid Line
X A-1 Hand Specimen Location
6113
DEVELOPMENT COMPANY
OF CANADA, LTD.
TAN CLAIMS
TRENCH LOCATIONS
MAIN SHOWING AREA
20
0
20
FEET
NTS: 92H/4W
NEW WESTMINSTER M.D.
G. L. GARBATT
SEPTEMBER 1976
LINE 5
LINE 4E
LINE 3



MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 6

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

TAN CLAIMS

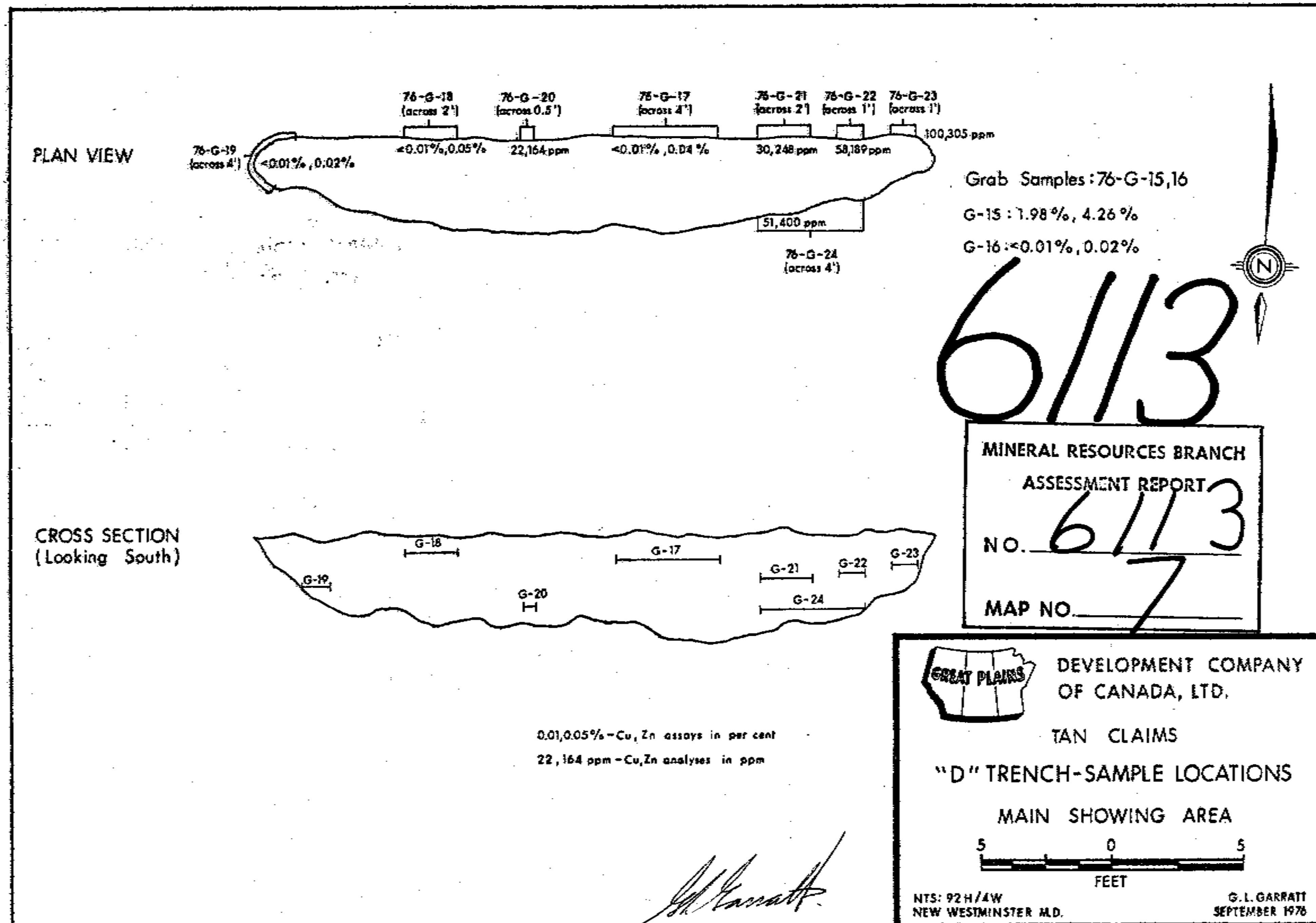
"A" TRENCH-SAMPLE LOCATIONS

MAIN SHOWING AREA

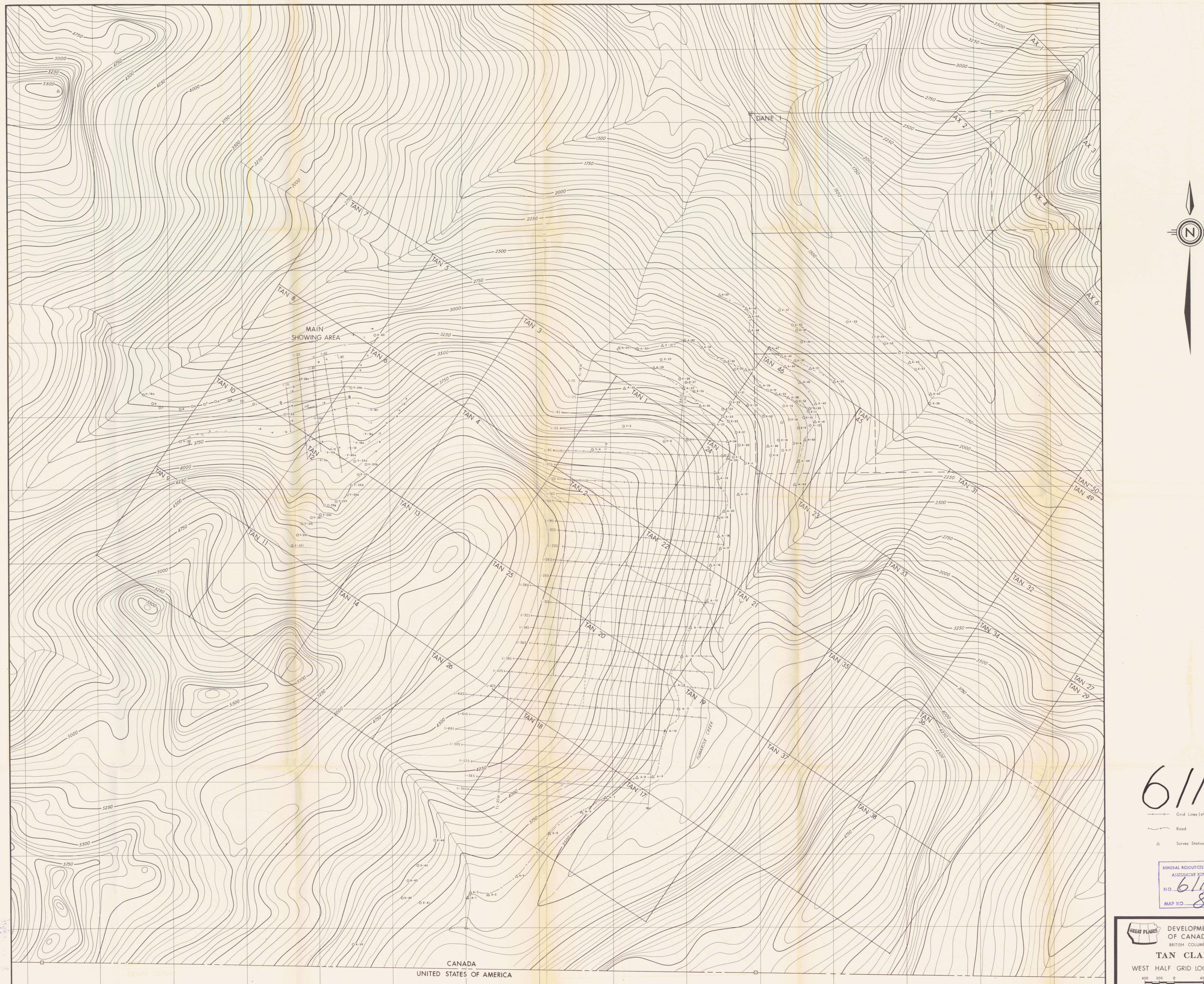
2 0 2
FEET

NTS: 92 H/4W
NEW WESTMINSTER M.D.

G. L. GARRATT
SEPTEMBER 1976



PLAN VIEW
76-G-19 (across 4')
<0.01% , 0.02%
76-G-18 (across 2')
<0.01%, 0.05%
76-G-20 (across 0.5')
22,164 ppm
76-G-17 (across 4')
<0.01% , 0.04 %
76-G-21 (across 2')
30,248 ppm
76-G-22 (across 1')
58,189 ppm
76-G-23 (across 1')
100,305 ppm
51,400 ppm
76-G-24 (across 4')
Grab Samples : 76-G-15,16
G-15 : 1.98 %, 4.26 %
G-16 : <0.01%, 0.02%
N
6113
CROSS SECTION (Looking South)
G-18
G-17
G-19
G-20
G-21
G-22
G-23
G-24
0.01,0.05% - Cu, Zn assays in per cent
22,164 ppm - Cu, Zn analyses in ppm
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 7
GREAT PLAINS
DEVELOPMENT COMPANY OF CANADA, LTD.
TAN CLAIMS
"D" TRENCH-SAMPLE LOCATIONS
MAIN SHOWING AREA
5
0
5
FEET
NTS: 92 H/4W
NEW WESTMINSTER M.D.
G. L. GARRATT
SEPTEMBER 1976



6113

Grid Lines (stations)

Road

Survey Stations

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

BRITISH COLUMBIA

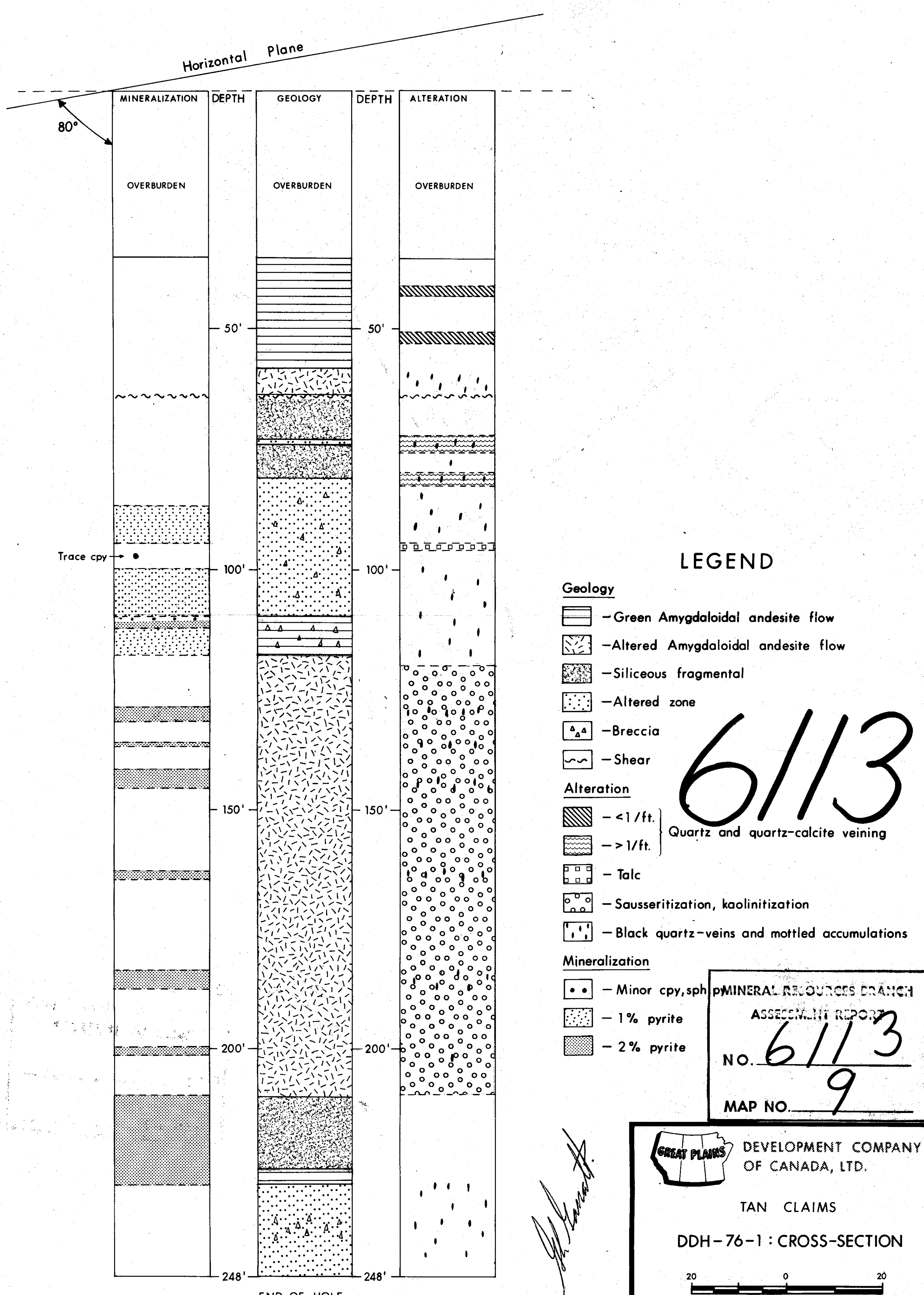
TAN CLAIMS

WEST HALF GRID LOCATION MAP

400 200 0 400 800
FEET

NEW WESTMINSTER M.D.
G. L. GARRATT

NTS: 92 H-4 W
SEPTEMBER 1975



6113

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT

NO. 6113

MAP NO. 9

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

TAN CLAIMS

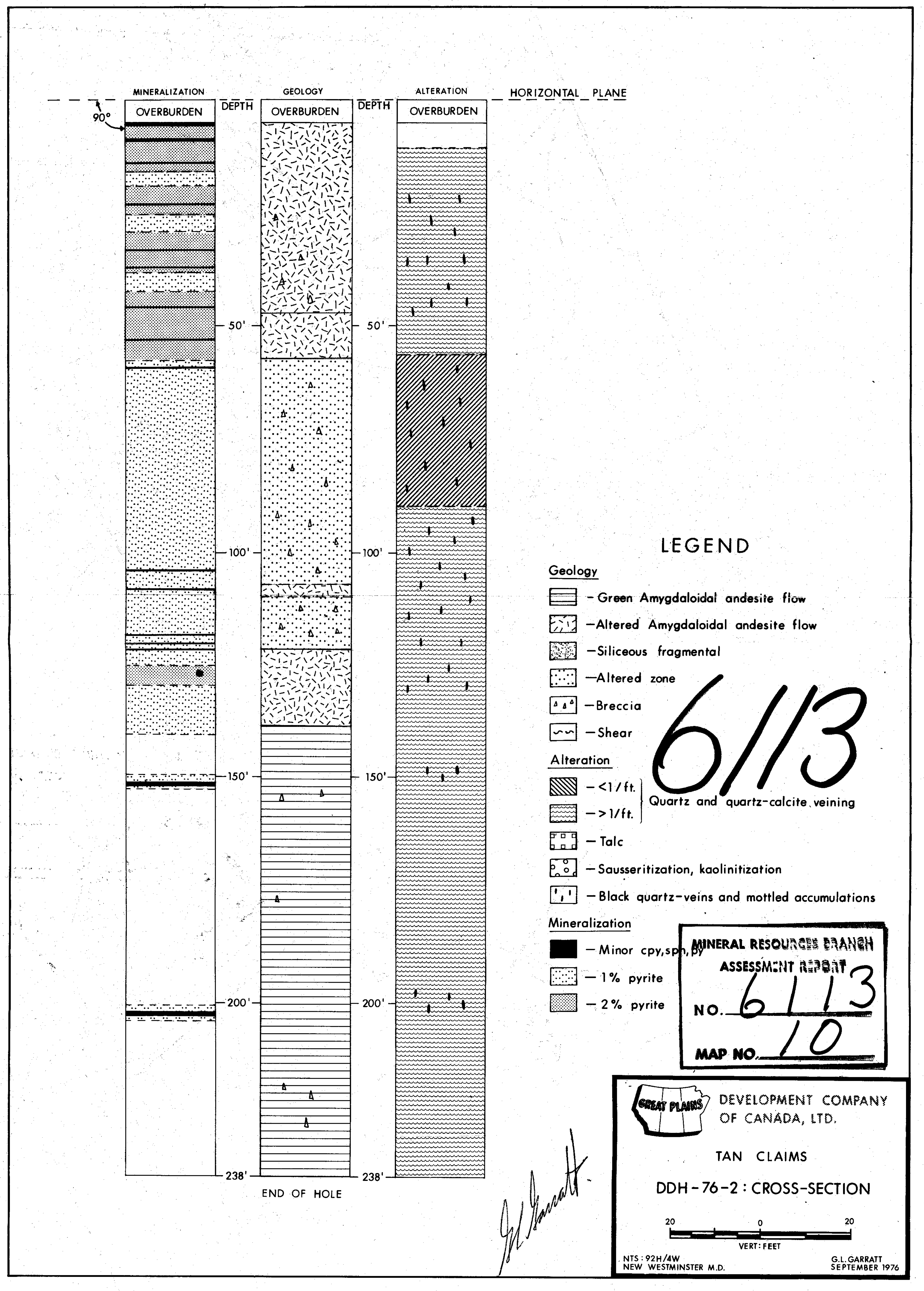
DDH-76-1 : CROSS-SECTION

20 0 20

VERT : FEET

NTS : 92H/4W
NEW WESTMINSTER M.D.

G.L. GARRATT
SEPTEMBER 1976


MINERALIZATION
GEOLOGY
ALTERATION
HORIZONTAL PLANE
90°
OVERBURDEN
DEPTH
OVERBURDEN
DEPTH
OVERBURDEN
50'
50'
100'
100'
150'
150'
200'
200'
238'
238'
END OF HOLE
LEGEND
Geology
– Green Amygdaloidal andesite flow
–Altered Amygdaloidal andesite flow
–Siliceous fragmental
–Altered zone
–Breccia
–Shear
Alteration
– <1/ft.
– >1/ft.
Quartz and quartz-calcite veining
– Talc
– Sausseritization, kaolinitization
– Black quartz-veins and mottled accumulations
Mineralization
– Minor cpy, sph, py
– 1% pyrite
– 2% pyrite
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 10
GREAT PLAINS
DEVELOPMENT COMPANY OF CANADA, LTD.
TAN CLAIMS
DDH-76-2 : CROSS-SECTION
20 0 20
VERT: FEET
NTS: 92H/4W
NEW WESTMINSTER M.D.
G.L. GARRATT
SEPTEMBER 1976

LEGEND

□ Cominco Sample Sites

6113

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

BRITISH COLUMBIA

TAN CLAIMS

Geochem EAST HALF

SAMPLE LOCATIONS

400 200 0 400 800

FEET

NEW WESTMINSTER M.D.
G. L. GARRATT

NTS: 92 H-4 W
SEPTEMBER 1975

G. L. Garratt.

LEGEND

- ○ Soil sample
- △ Stream sediment sample
- □ Cominco sample
- (R.C.) Rock chip sample
- A-12 Line number
- Cliff, escarpment
- Large boulder talus, skree
- (N.S.) No Sample
- Road

6113

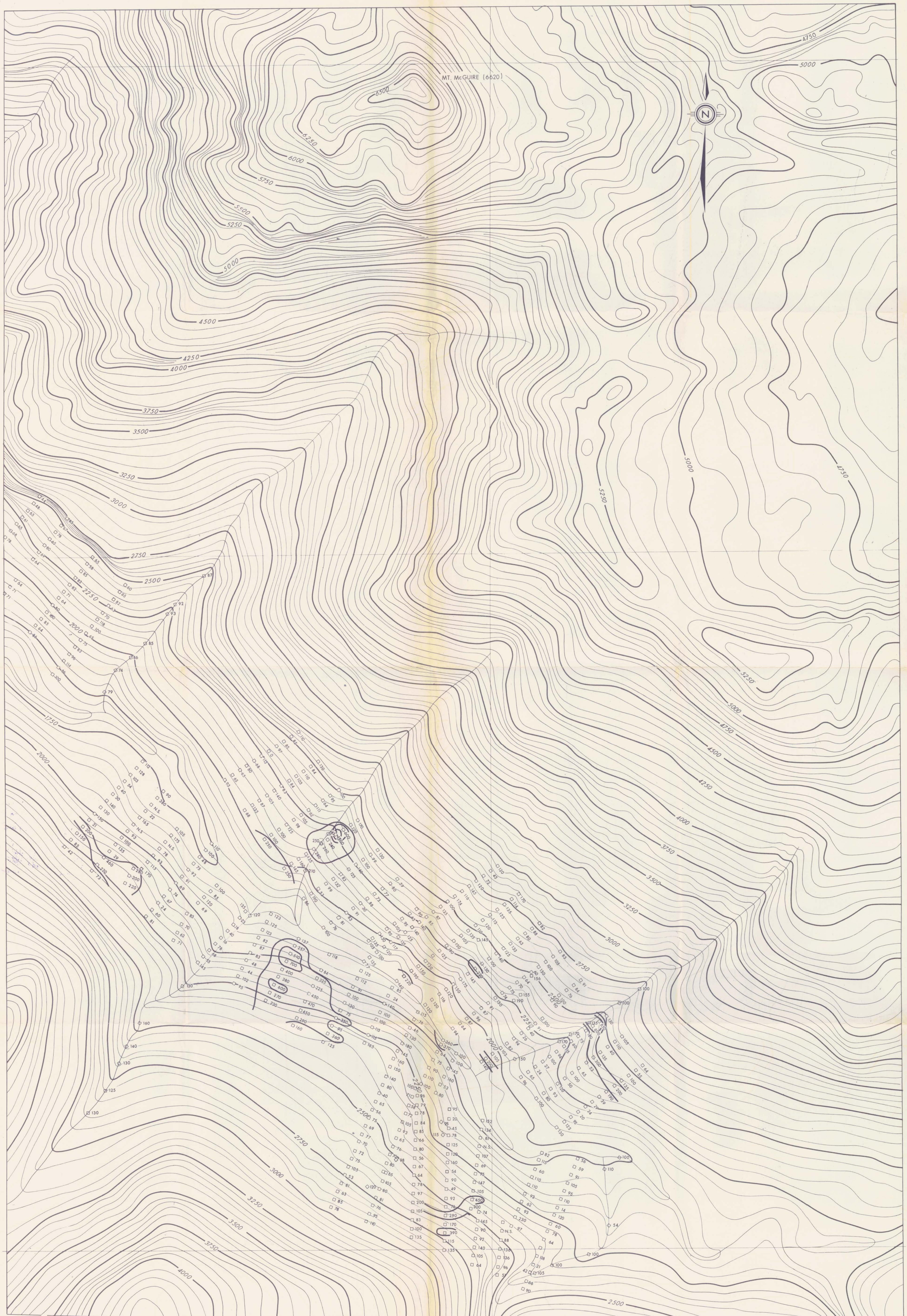
GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.
BRITISH COLUMBIA

TAN CLAIMS
WEST HALF
GEOCHEMICAL SAMPLE LOCATIONS

400 200 0 400 800
FEET

NEW WESTMINSTER M.D.
G. L. GARRATT

NTS: 92 H-4 W
SEPTEMBER 1975



6113

LEGEND

□ Cominco Sample Sites

95 Zinc value in p.p.m.

Zinc contours at 200, 500 & 1000 p.p.m.

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 13

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

BRITISH COLUMBIA

TAN CLAIMS

EAST HALF

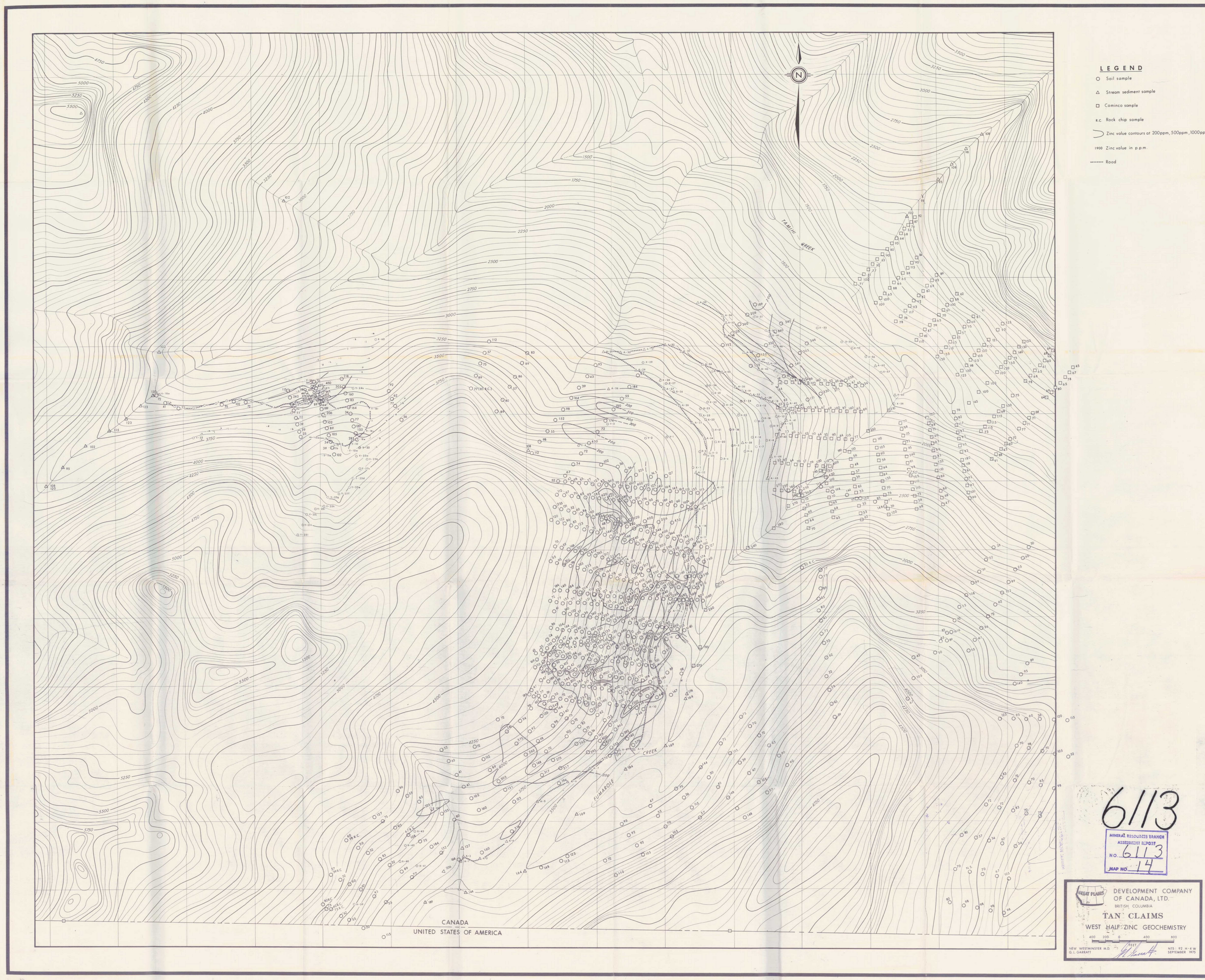
Zn GEOCHEMISTRY

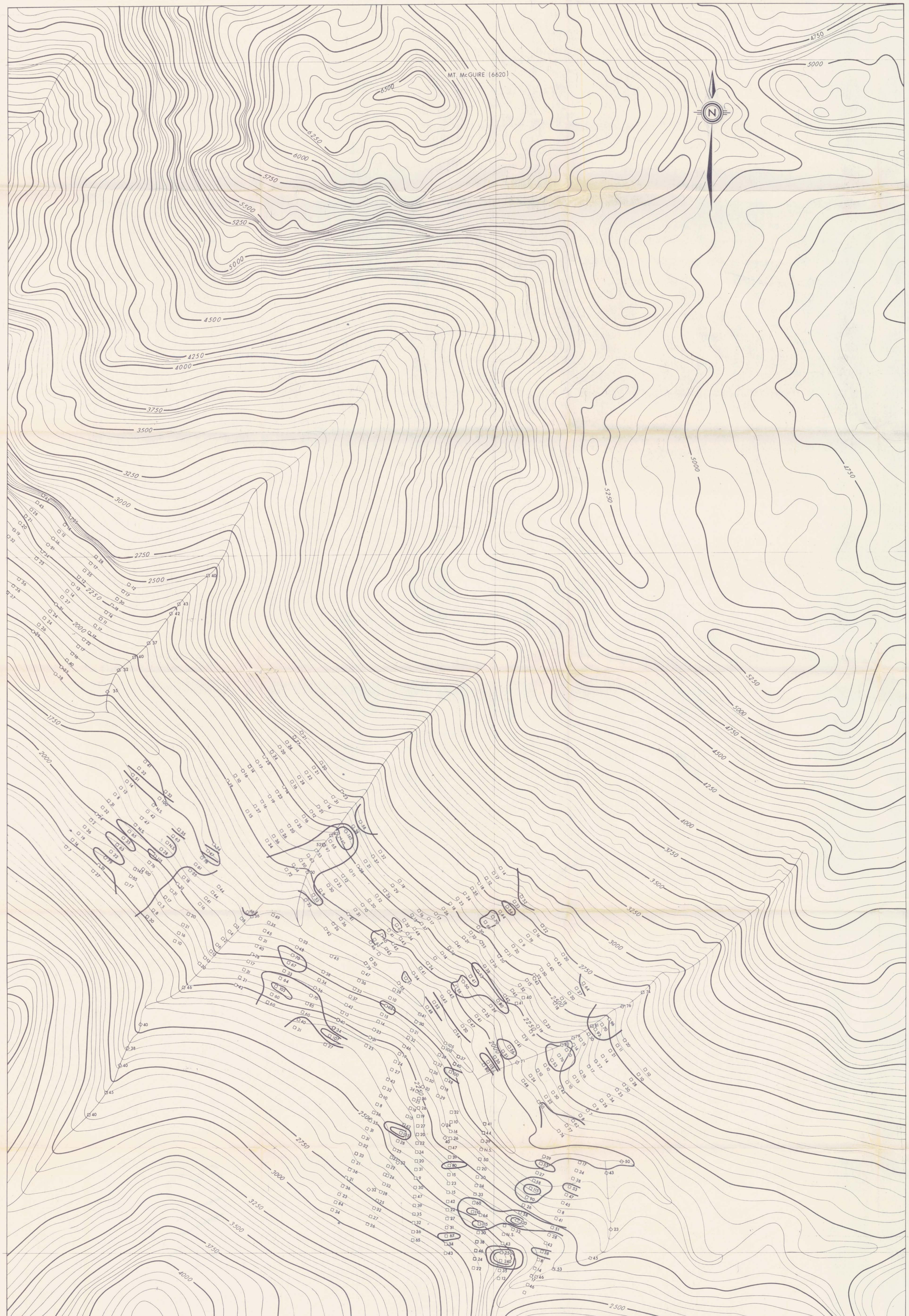
400 200 0 400 800
FEET

NEW WESTMINSTER M.D.
G. L. GARRATT

NTS: 92 H-4 W
SEPTEMBER 1975

G. L. Garratt


LEGEND
Soil sample
Stream sediment sample
Cominco sample
R.C. Rock chip sample
Zinc value contours at 200ppm, 500ppm, 1000ppm
1900 Zinc value in p.p.m.
Road
TAMIHI CREEK
FUMAROLE CREEK
CANADA
UNITED STATES OF AMERICA
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 14
GREAT PLAINS
DEVELOPMENT COMPANY
OF CANADA, LTD.
BRITISH COLUMBIA
TAN CLAIMS
WEST HALF: ZINC GEOCHEMISTRY
400 200 0 400 800
FEET
NEW WESTMINSTER M.D.
G. L. GARRATT
NTS: 92 H-4 W
SEPTEMBER 1975



LEGEND 6113

□ Cominco Sample Sites

30 Copper value in p.p.m.

Copper value contours at 50, 100 & 200 p.p.m.

GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

BRITISH COLUMBIA

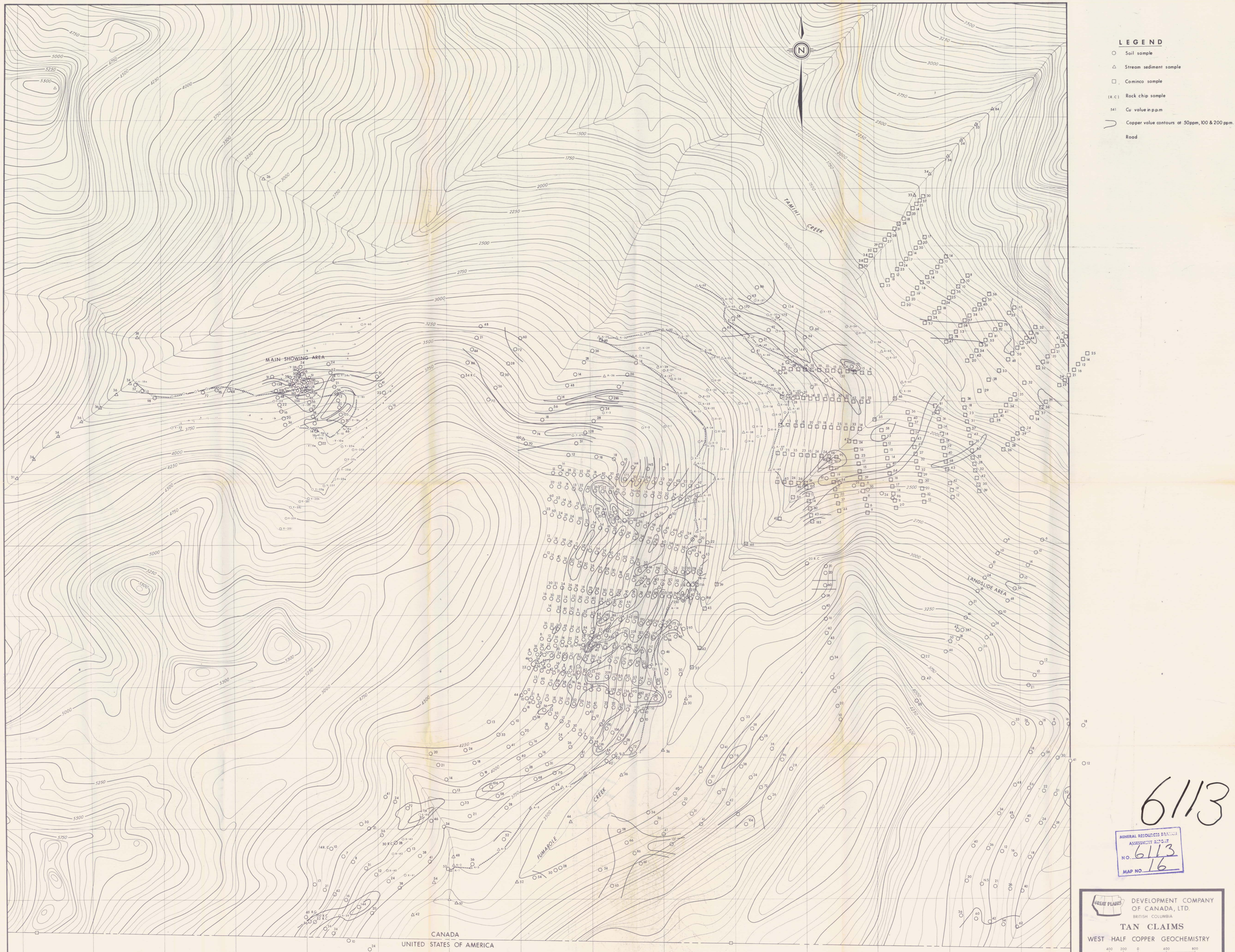
TAN CLAIMS
EAST HALF
Cu GEOCHEMISTRY

400 200 0 400 800
FEET

NEW WESTMINSTER M.D.
G. L. GARRATT

NTS: 92 H-4 W
SEPTEMBER 1975

G. L. Garratt



6113

DEVELOPMENT COMPANY OF CANADA, LTD.
BRITISH COLUMBIA

TAN CLAIMS

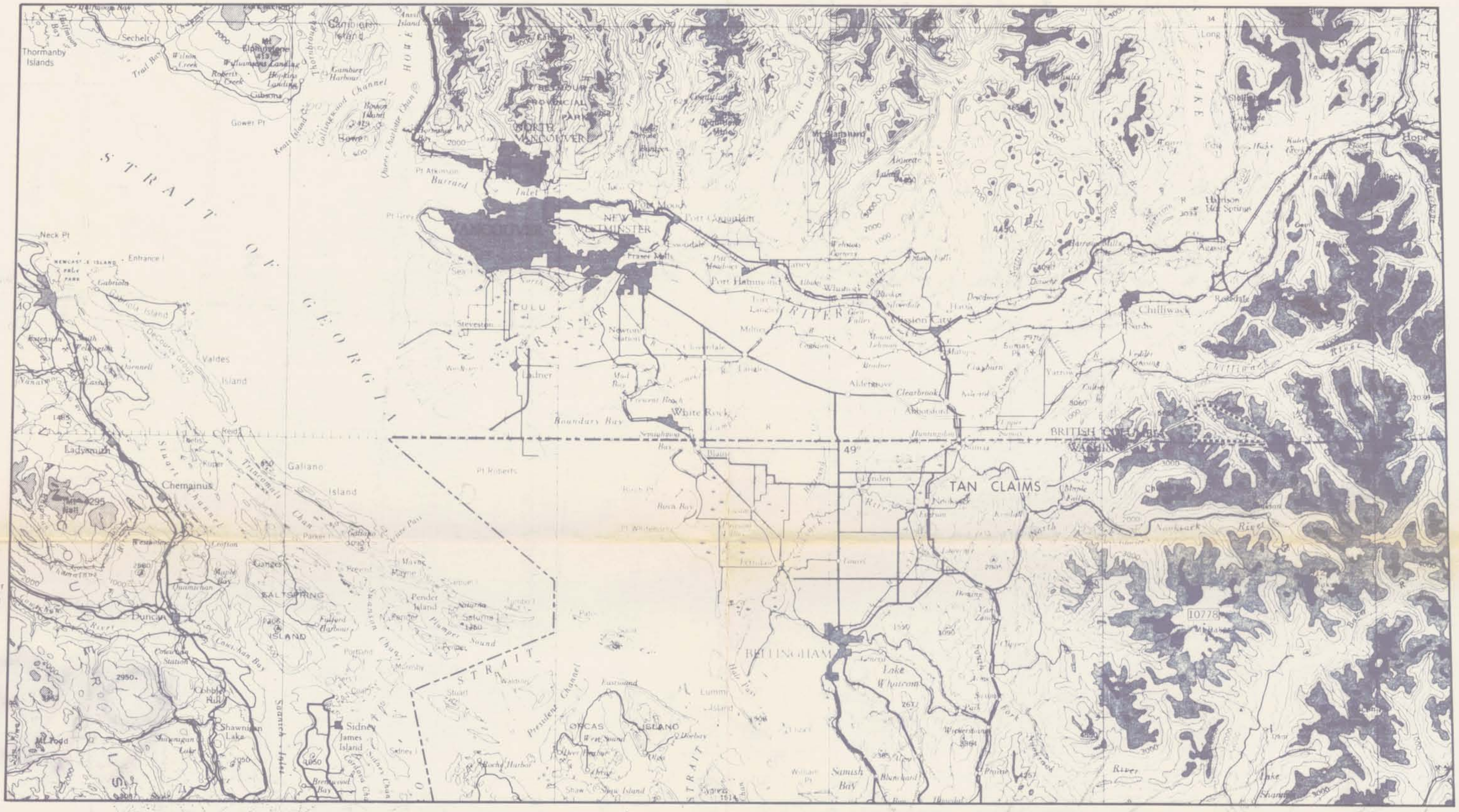
WEST HALF COPPER GEOCHEMISTRY

400 200 0 400 800
FEET

NEW WESTMINSTER M.D.
G. L. GARRATT

NTS: 92 H-4 W
SEPTEMBER 1975

G. Garratt



GREAT PLAINS DEVELOPMENT COMPANY OF CANADA, LTD.

BRITISH COLUMBIA

TAN CLAIMS

LOCATION MAP

5 0 10 20

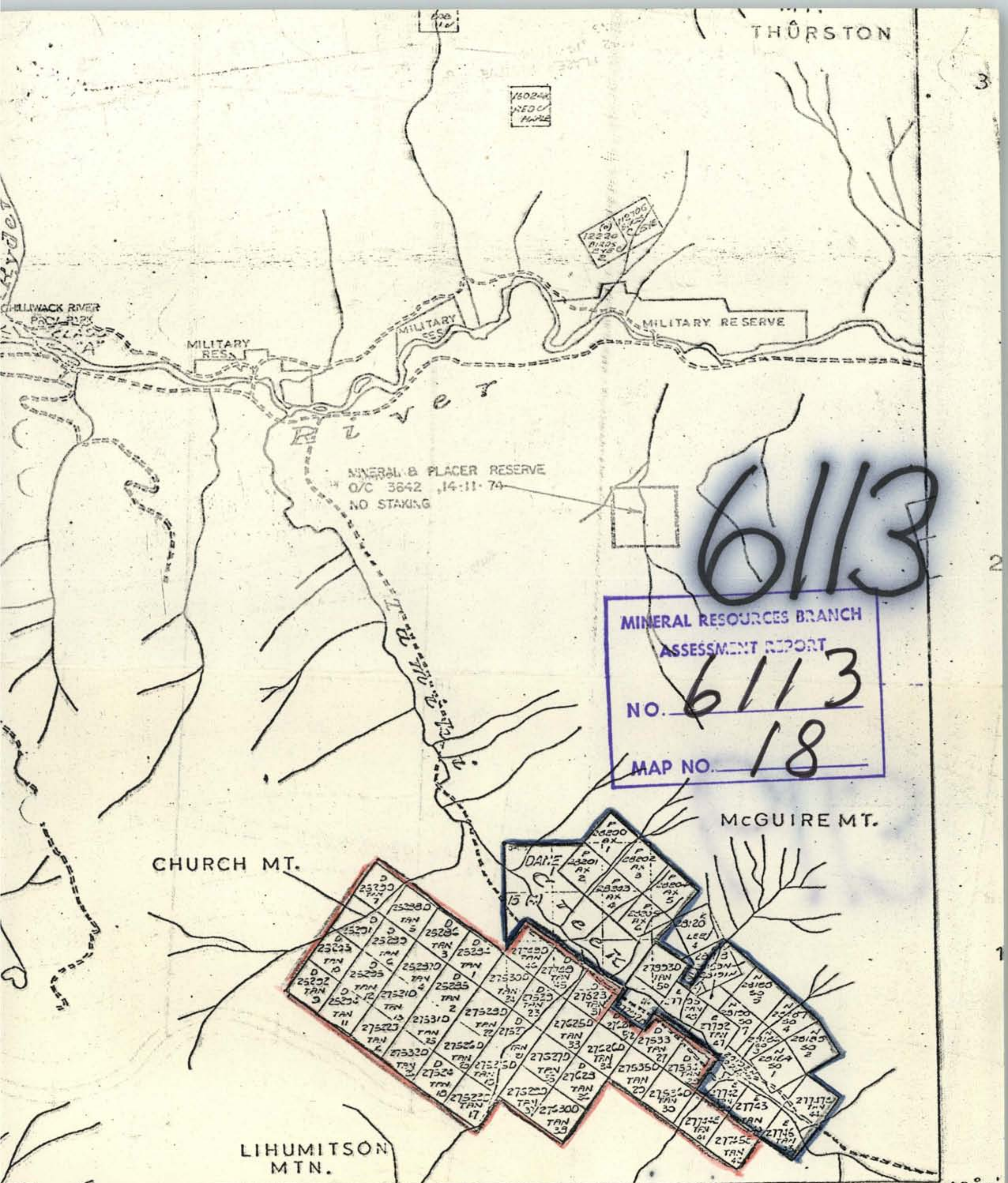
MILES

SCALE 1: 500,000

NEW WESTMINSTER M.D.
G. GARRATT

NTS: 92 H-4W
NOVEMBER 1975

6113



MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 18

6113

ional Boundary

B A

AND PETROLEUM RESOURCES

This map is prepared to serve as a guide to the positions of located mineral claims

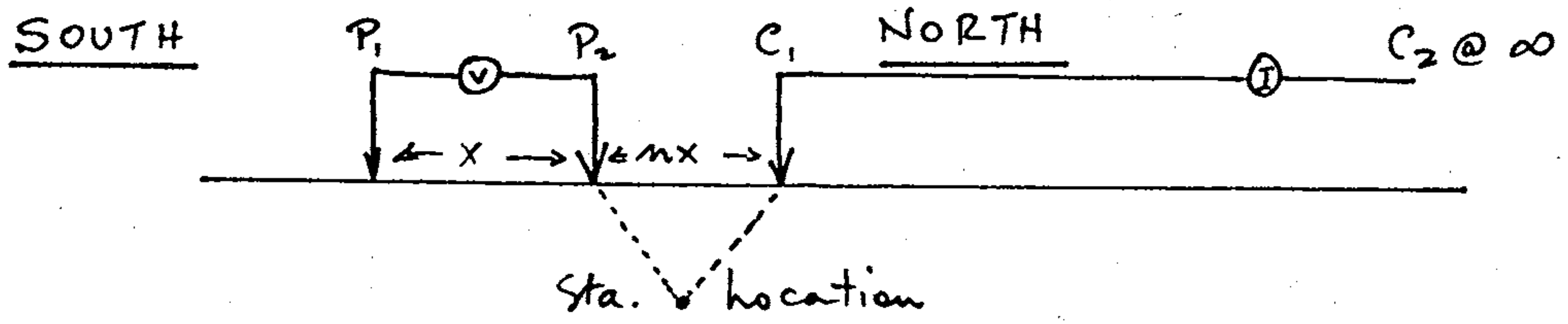
Copies for:
Glen Garratt
Great Plains
Chilliwack.

John Lloyd P. Eng.
June 29, 1976.

PRELIMINARY COPY

TAN SHOWING AREA : LEGEND

POLE-DIPOLE ARRAY



x = 100' ; n = 1, 2, 3 and 4.

The measuring dipole P_1P_2 was always to the SOUTH of the leading current electrode C_1

Instrument Parameters

Total Cycle Time .... T_c = 8 secs.
Duty Ratio .... R = 1:1
Delay Time .... t_d = 120 ms.

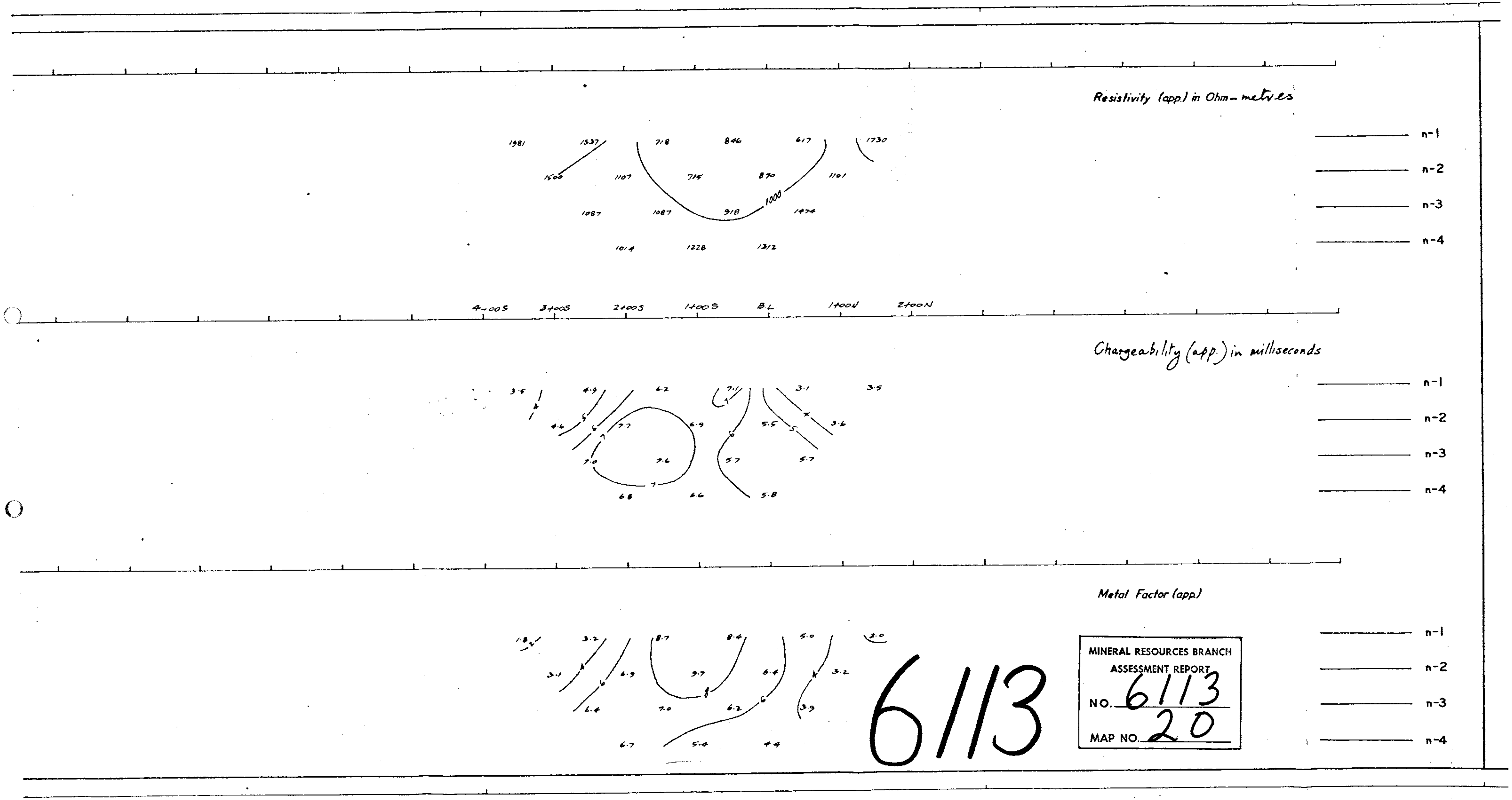
6113

Integrating Interval .... t_p = 60 ms.
Total Integrating Time .... T_p = 900 ms.

Chargeability Contour Int = 1 ms.
Resistivity Contour Int. = 500 Ω m.
Metal Factor Contour Int = 2.

Scale 1" = 100 ft.

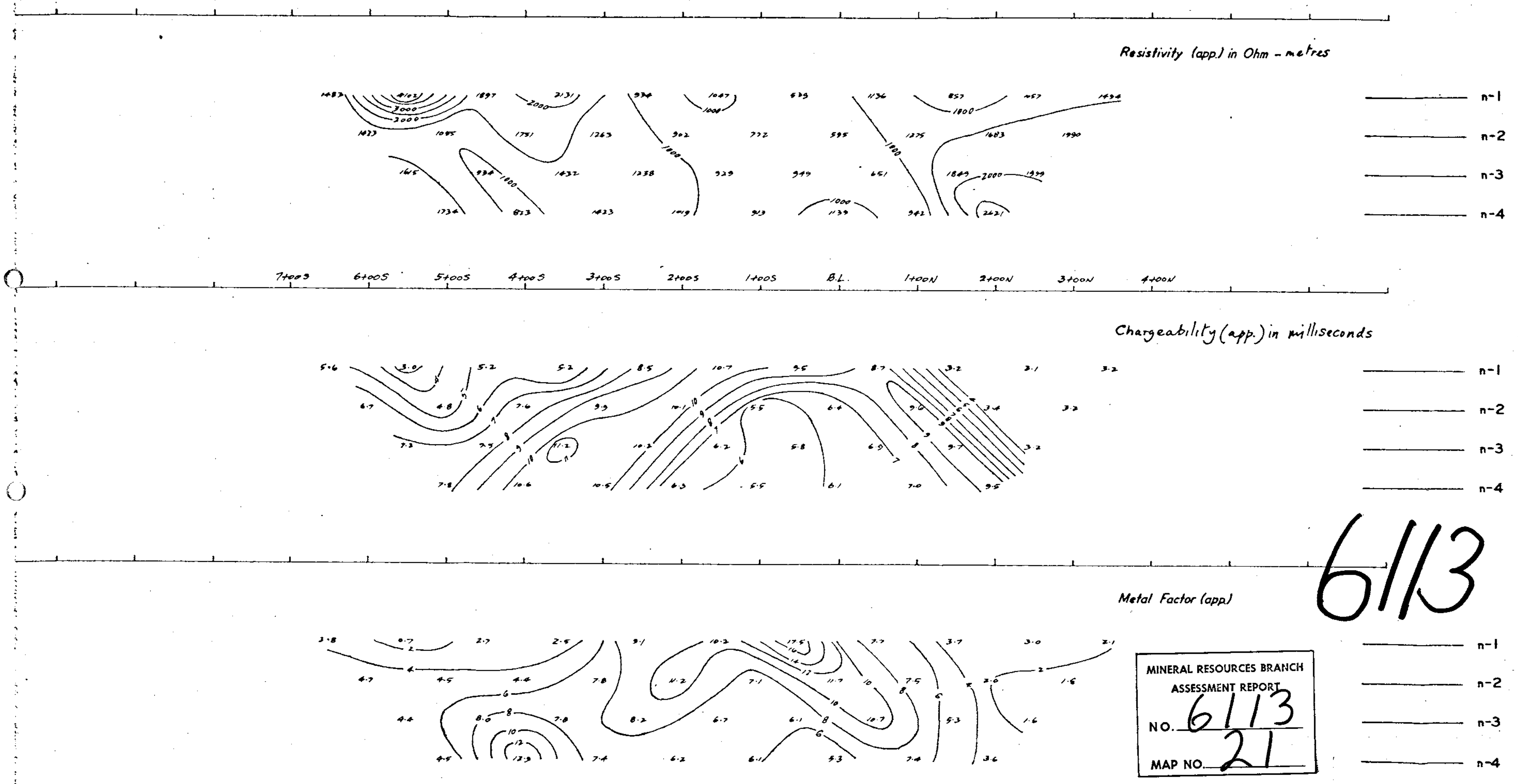
TAN SHOWING AREA LINE : 0+00



6113

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 20

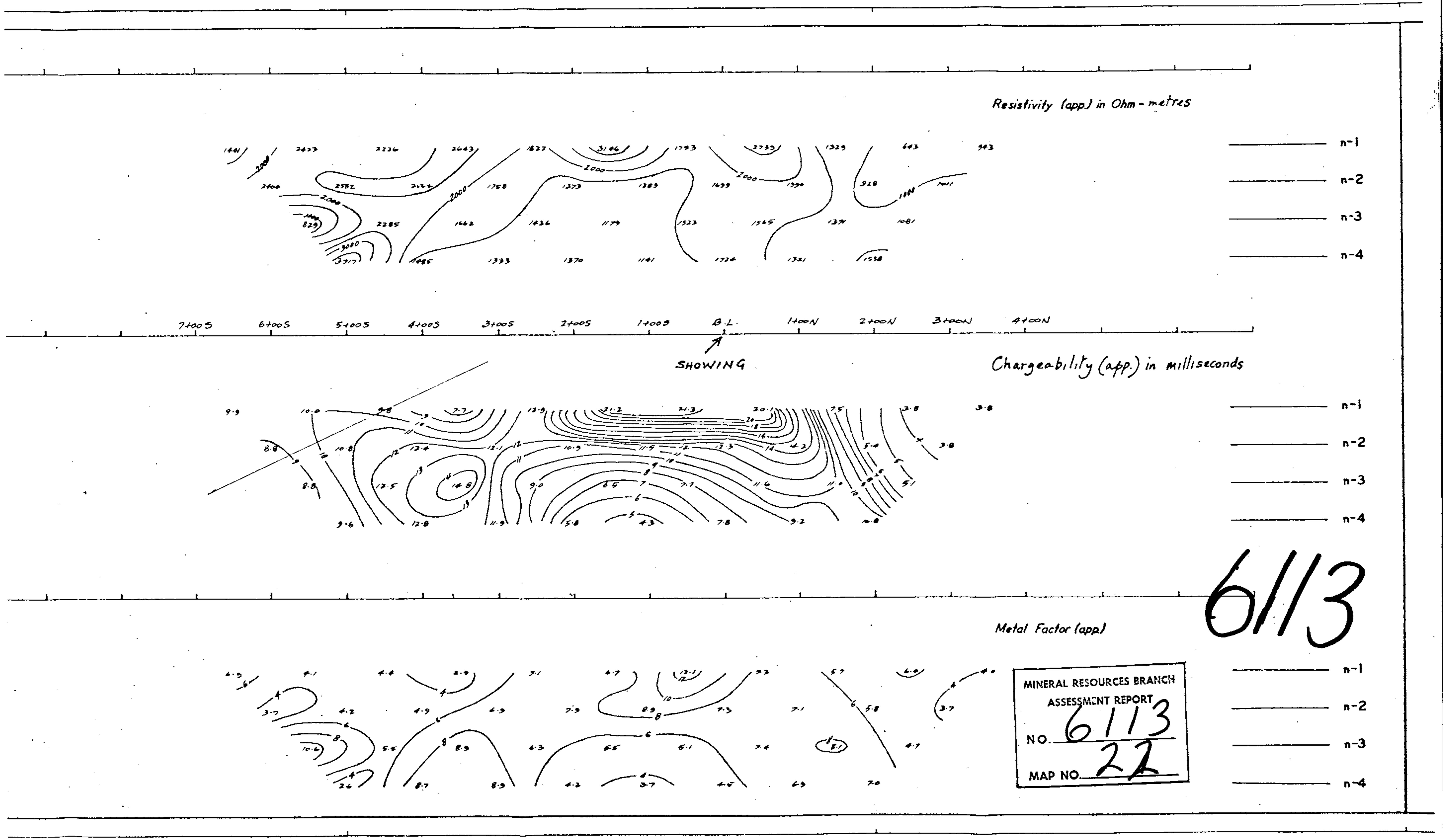
TAN SHOWING AREA LINE: 2+00E



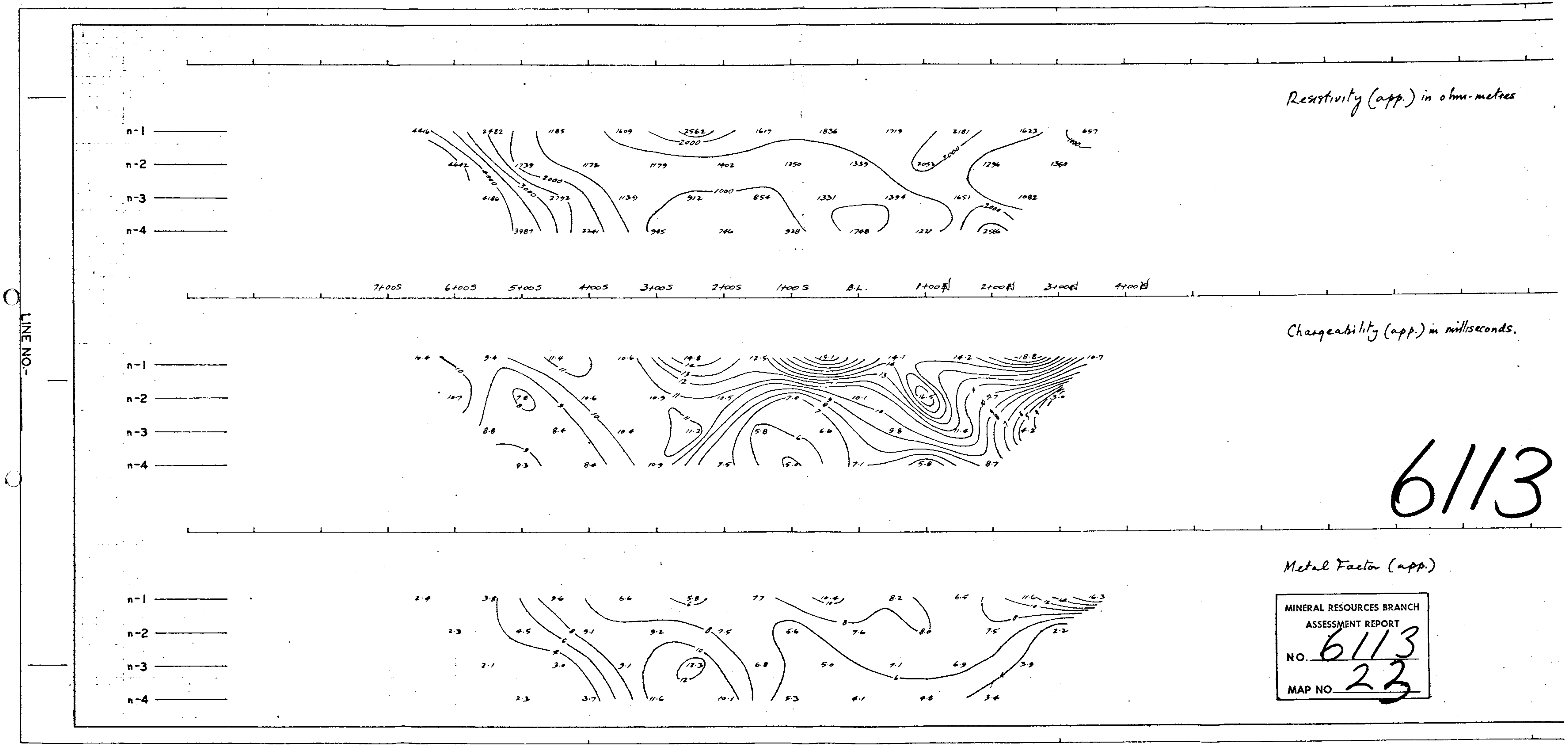
6113

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 21

TAN SHOWING AREA   LINE: 4+00E



TAN SHOWING AREA LINE : 6+00E



MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 23

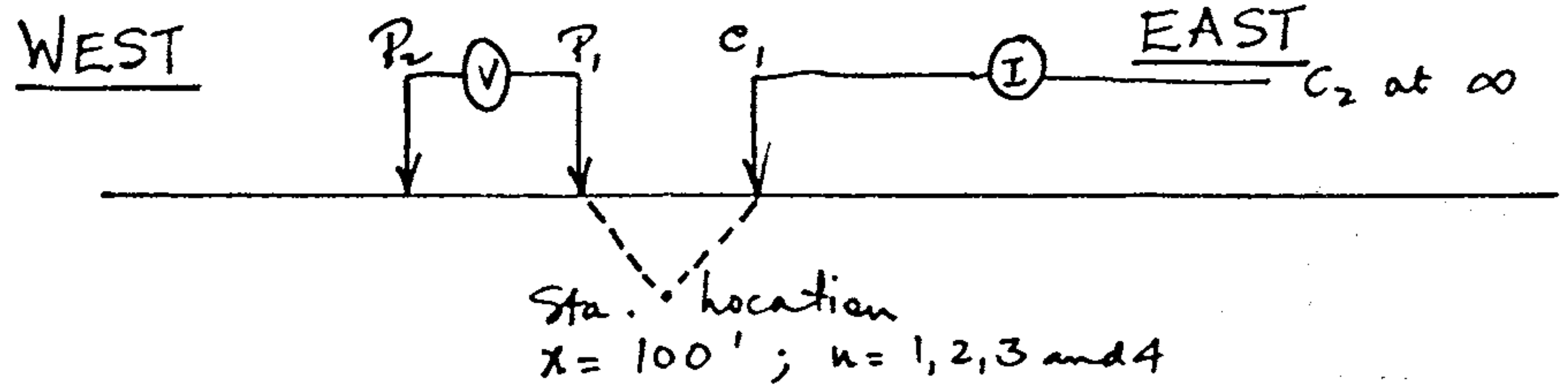
Copies for:
Glen Garratt
Great Plains
Chilliwack

John Lloyd P. Eng.
June 29, 1976.

PRELIMINARY COPY

MAIN GRID AREA : LEGEND

POLE - DIPOLE ARRAY



The measuring dipole P_1P_2 was always to the WEST of the leading current electrode C_1

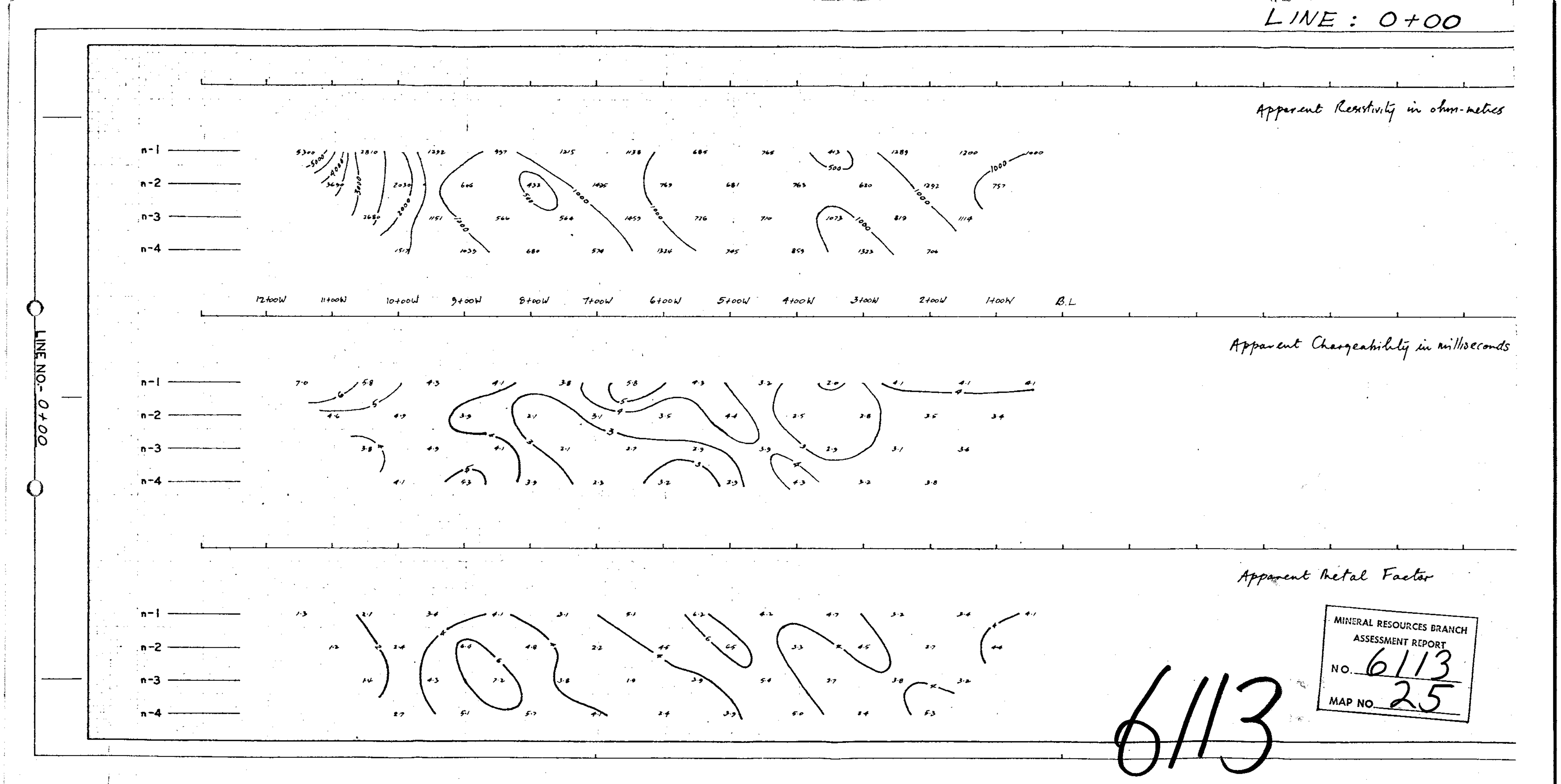
Instrument Parameters

Total Cycle Time .... T_c = 8 seconds
Duty Ratio .... R = 1 : 1
Delay Time .... t_d = 120 ms.
Integrating Interval .... t_p = 60 ms.
Total Integrating Time .... T_p = 900 ms.

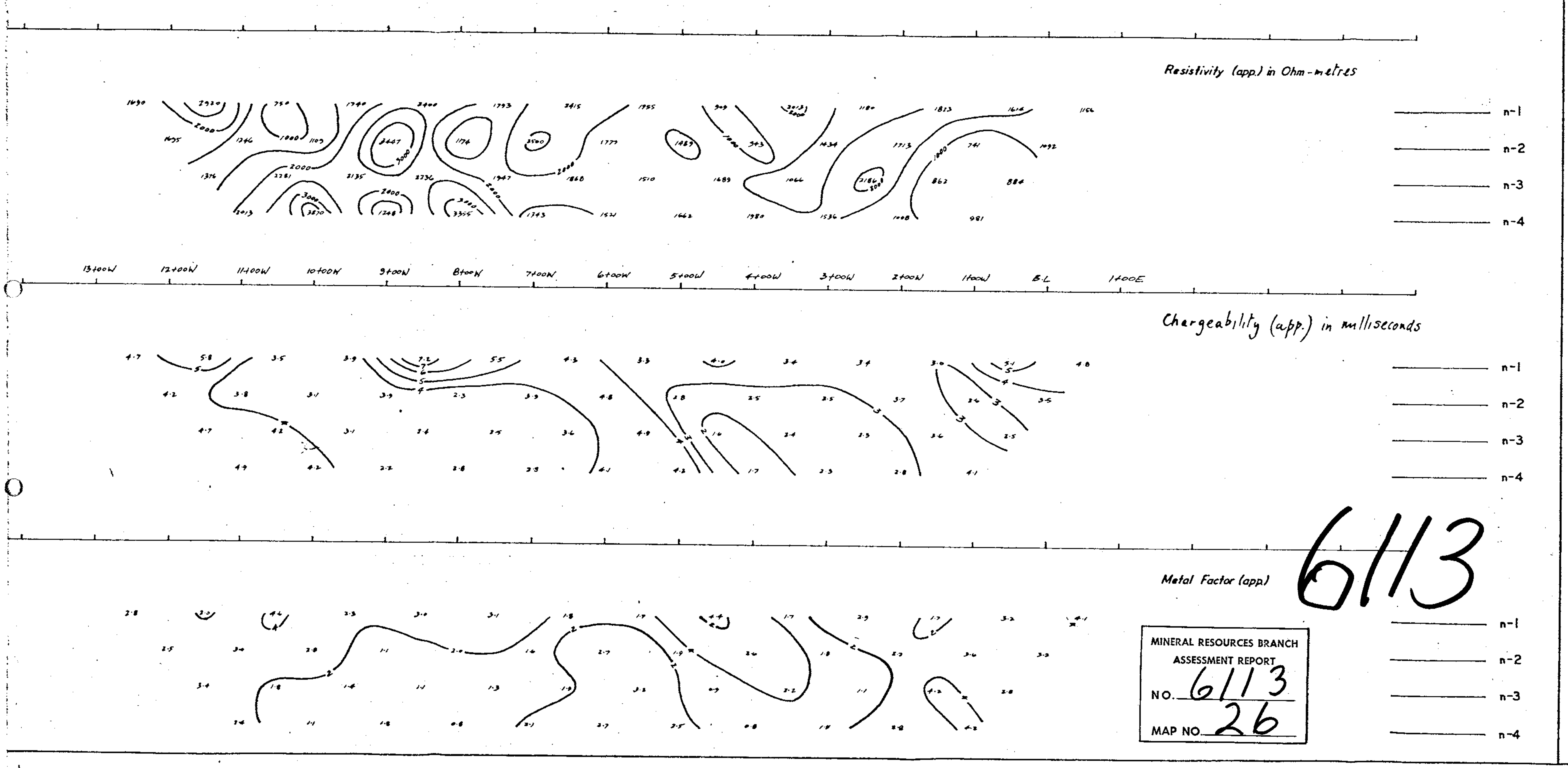
Chargeability Contour Int. = 1 ms.
Resistivity Contour Int. = 500 Ωm
Metal Factor Cont. Int = 2

Scale 1" = 100 ft.

6113


LINE : 0+00
LINE NO.- 0+00
Apparent Resistivity in ohm-metres
Apparent Chargeability in milliseconds
Apparent Metal Factor
n-1
n-2
n-3
n-4
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L
6113

LINE:2+00S



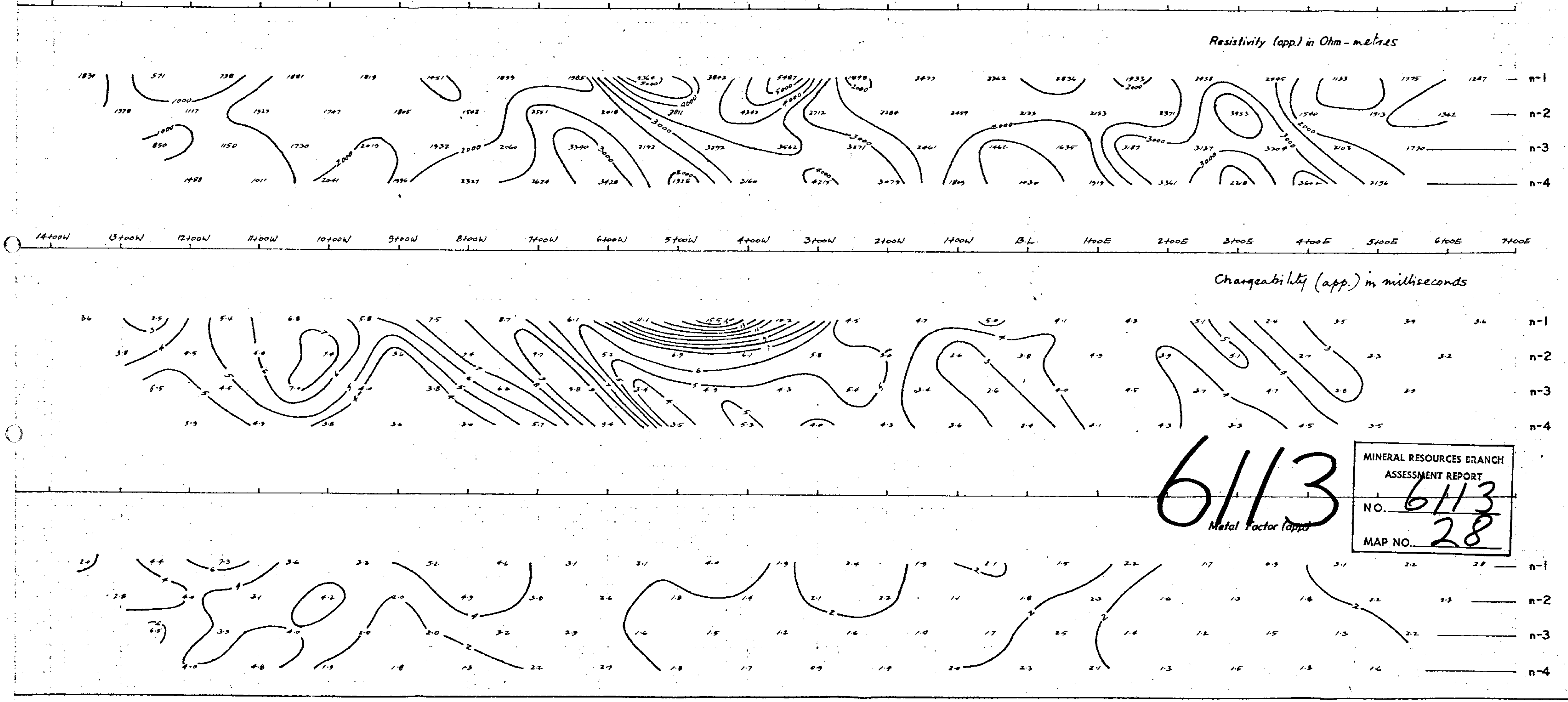
6113

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 26

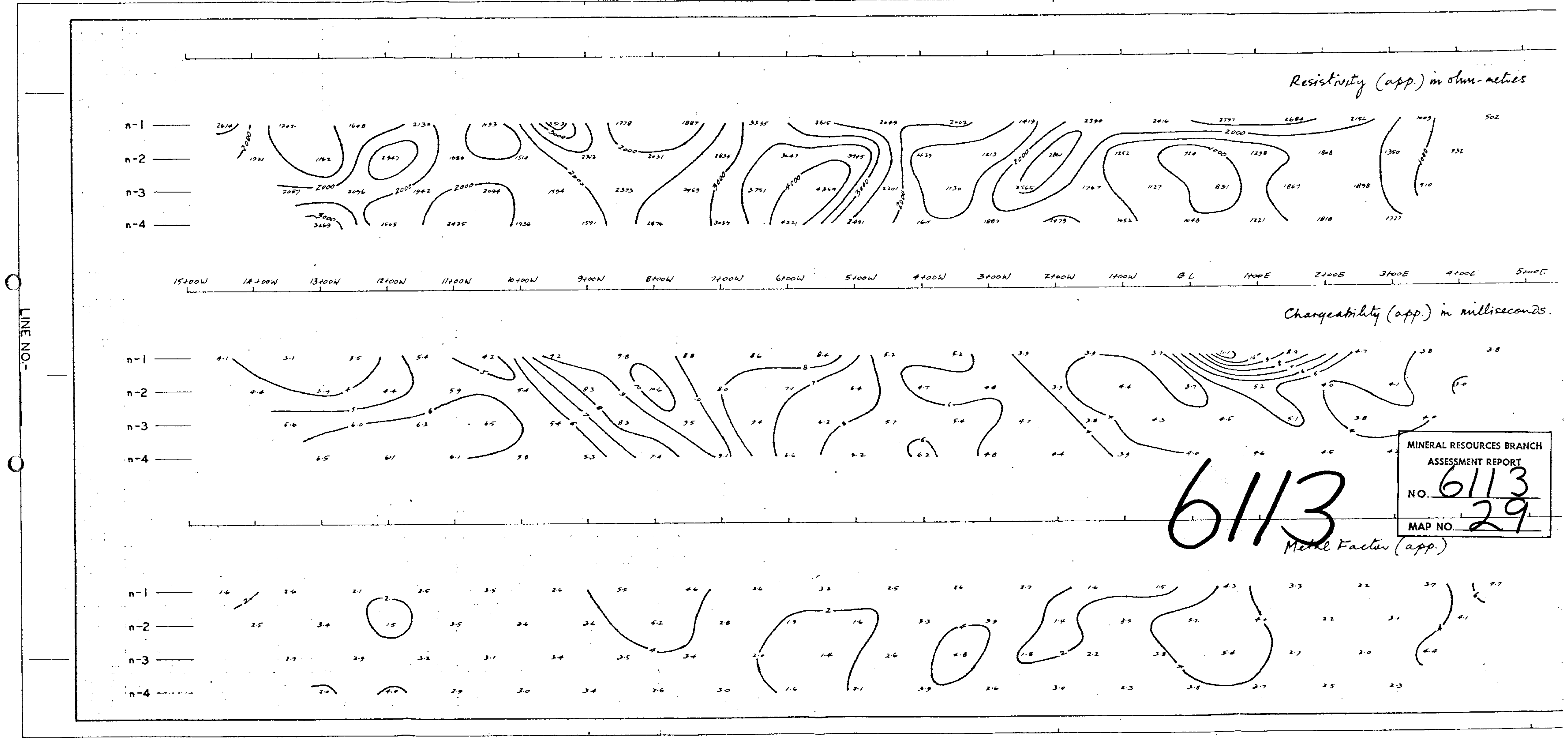
LINE : 4+00S

Resistivity (app.) in ohm-metres
Chargeability (app.) in milliseconds.
Metal Factor (app.)
n-1
n-2
n-3
n-4
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
3+00E
4+00E
LINE NO.-
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 27

LINE : 8+00S


Resistivity (app.) in Ohm-metres
n-1
n-2
n-3
n-4
14+00W
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
3+00E
4+00E
5+00E
6+00E
7+00E
Chargeability (app.) in milliseconds
Metal Factor (app.)
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 28

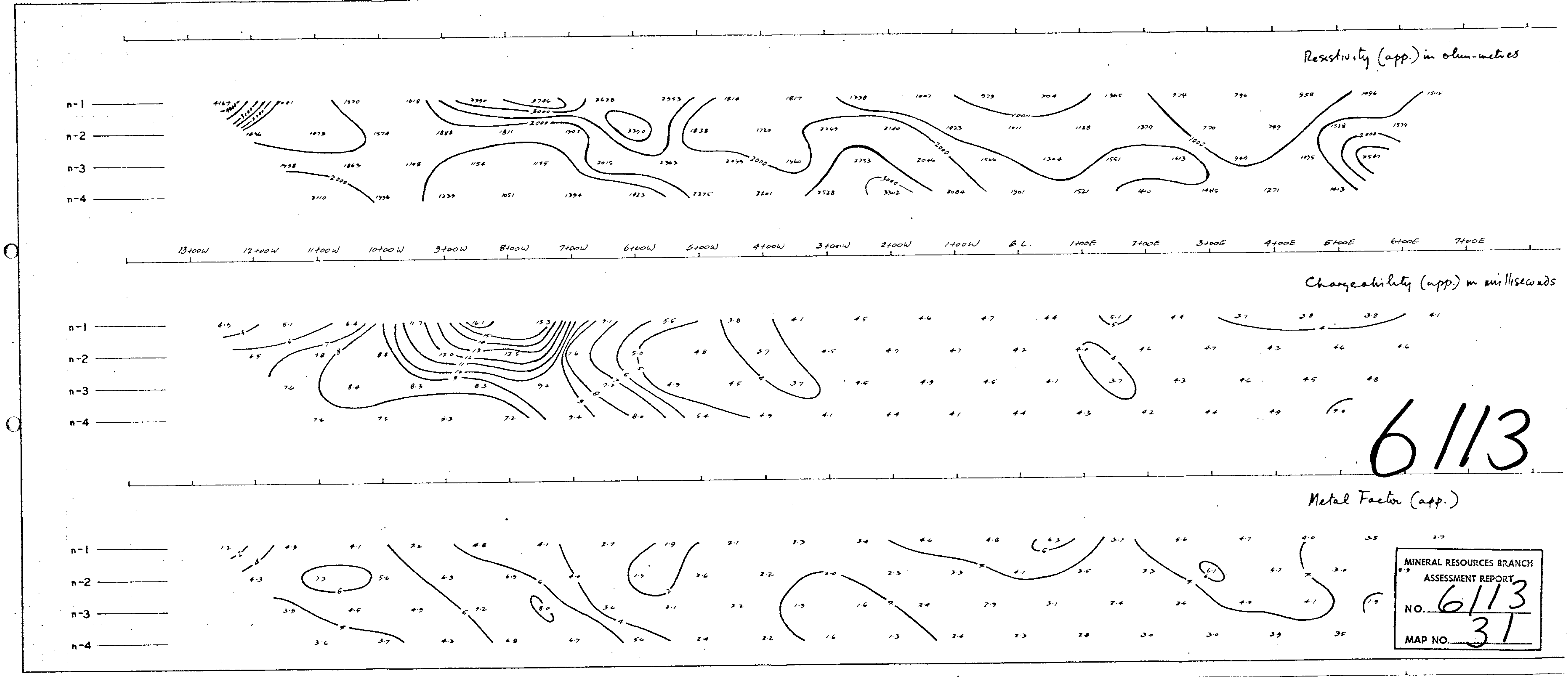
LINE : 12+00S


Resistivity (app.) in ohm-metres
Chargeability (app.) in milliseconds.
Metal Factor (app.)
n-1
n-2
n-3
n-4
15+00W
14+00W
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L
1+00E
2+00E
3+00E
4+00E
5+00E
LINE NO.-
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 29

LINE: 16+00S

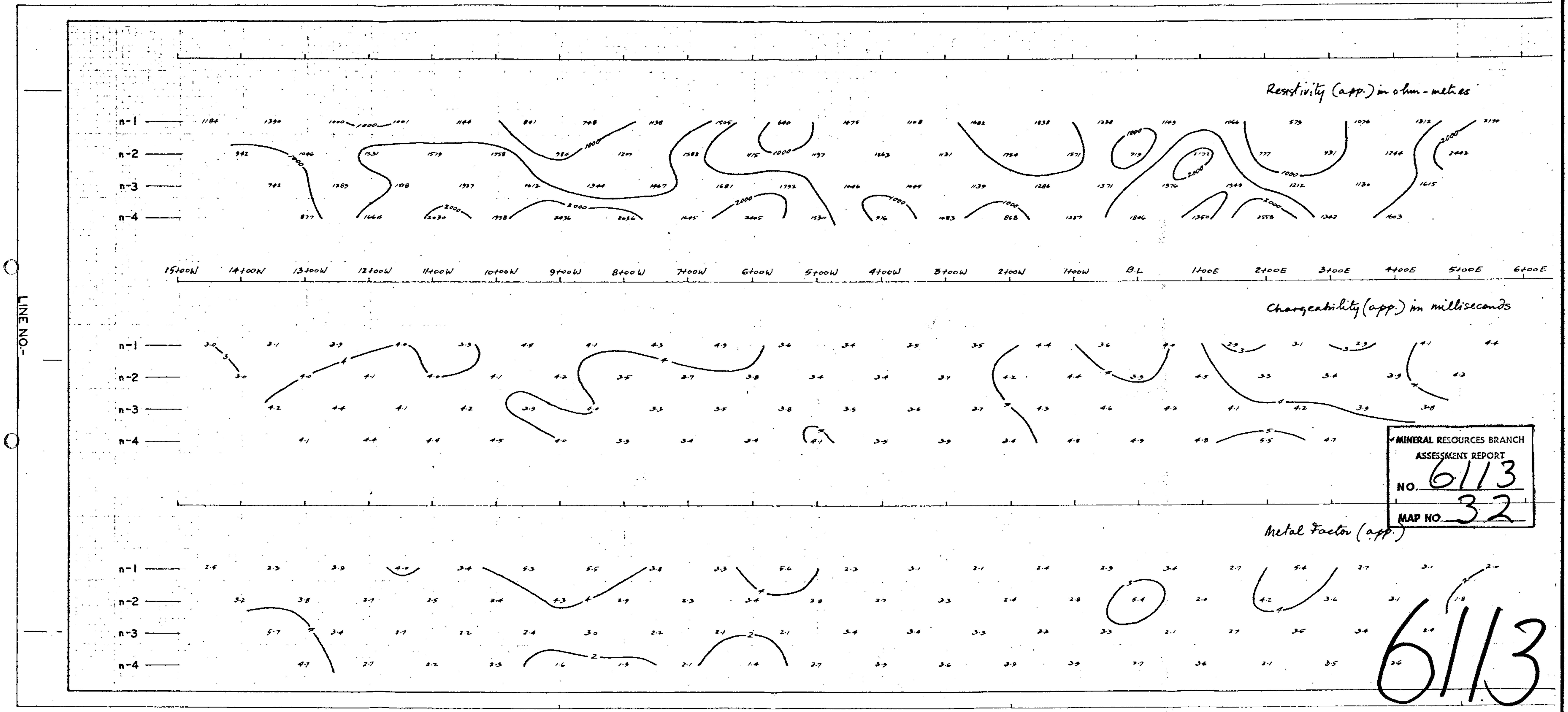
LINE NO.
Resistivity (app.) in ohm-metres
n-1
n-2
n-3
n-4
15+00W
14+00W
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
3+00E
4+00E
5+00E
6+00E
Chargeability (app.) in milliseconds
Metal Factor (app.)

LINE : 20+00S



Resistivity (app.) in ohm-metres
n-1
n-2
n-3
n-4
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
3+00E
4+00E
5+00E
6+00E
7+00E
Chargeability (app.) in milliseconds
n-1
n-2
n-3
n-4
6113
Metal Factor (app.)
n-1
n-2
n-3
n-4
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 31

LINE: 28+00S



LINE NO.-
Resistivity (app.) in ohm-metres
Chargeability (app.) in milliseconds
Metal Factor (app.)
n-1
n-2
n-3
n-4
15+00W
14+00W
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L
1+00E
2+00E
3+00E
4+00E
5+00E
6+00E
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 32
6113


LINE: 32+00S
LINE NO.-
Resistivity (app.) in Ohm-metres
Chargeability (app.) in milliseconds
Metal Factor (app.)
n-1
n-2
n-3
n-4
16+00W
15+00W
14+00W
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
3+00E
4+00E
5+00E
6+00E
7+00E
8+00E
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 33

LINE: 36+00S

LINE NO.
Resistivity (app.) in Ohm-metres
n-1
n-2
n-3
n-4
17+00W
16+00W
15+00W
14+00W
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L
1+00E
2+00E
3+00E
4+00E
5+00E
6+00E
7+00E
8+00E
Chargeability (app.) in milliseconds
Metal Factor (app.)
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 34

LINE : 40+00S

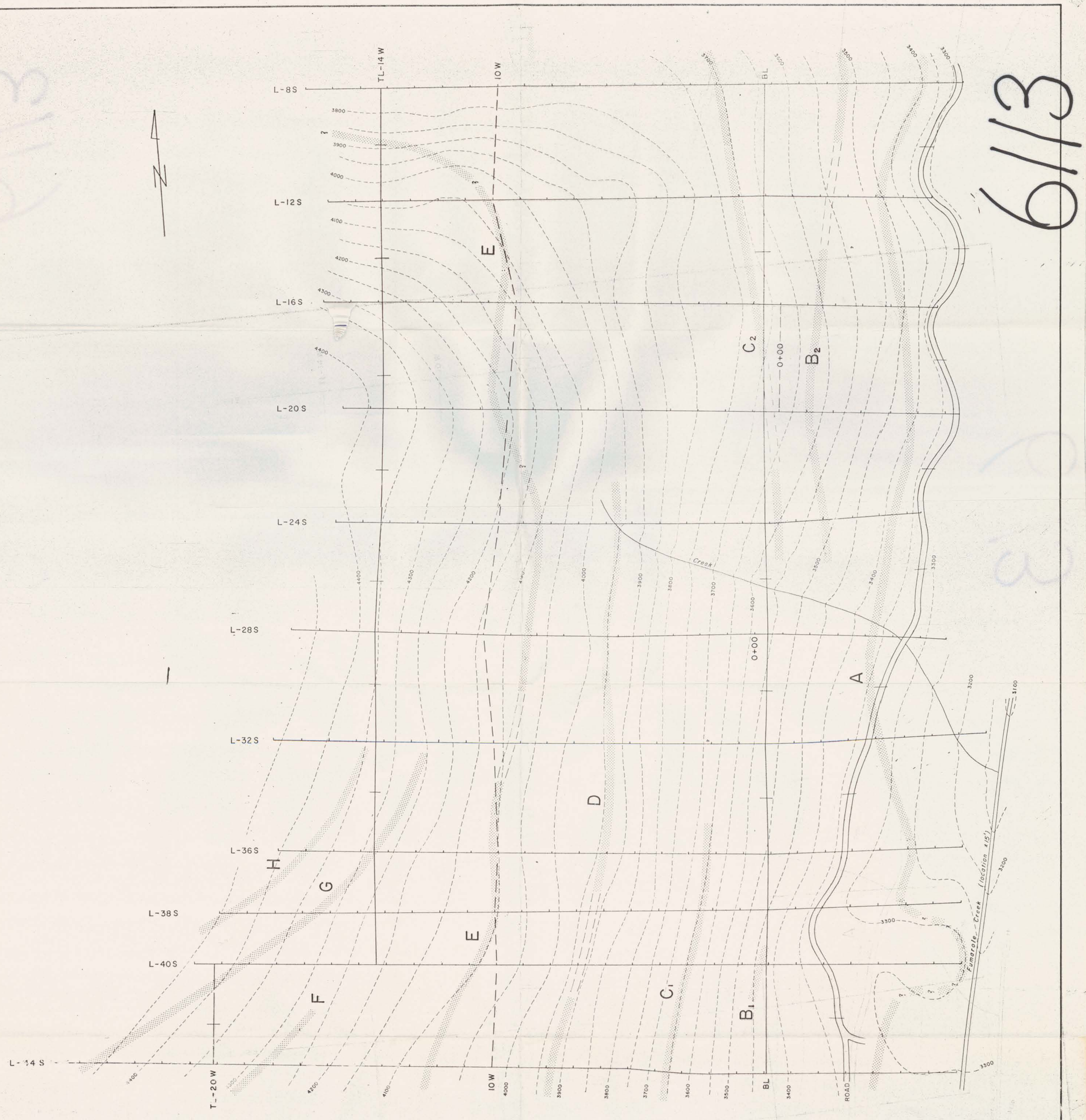
LINE NO.-
Resistivity (app.) in Ohm-metres
n-1
n-2
n-3
n-4
20+00W
19+00W
18+00W
17+00W
16+00W
15+00W
14+00W
13+00W
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
Chargeability (app.) in milliseconds
Metal Factor (app.)
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 35

LINE: 44+00S
Resistivity (app.) in Ohm-metres
Chargeability (app.) in milliseconds
Metal Factor (app.)
n-1
n-2
n-3
n-4
LINE NO.
B.L.
6113
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 36

LINE: 48+00S

6113

6113



Topo Contours & Interp. Cond Zones

NORCEN ENERGY RESOURCES LTD.

TAN CLAIM GROUP

FUMAROLE GRID

CHILLIWACK AREA

NEW WESTMINSTER MINING DIVISION, B.C.

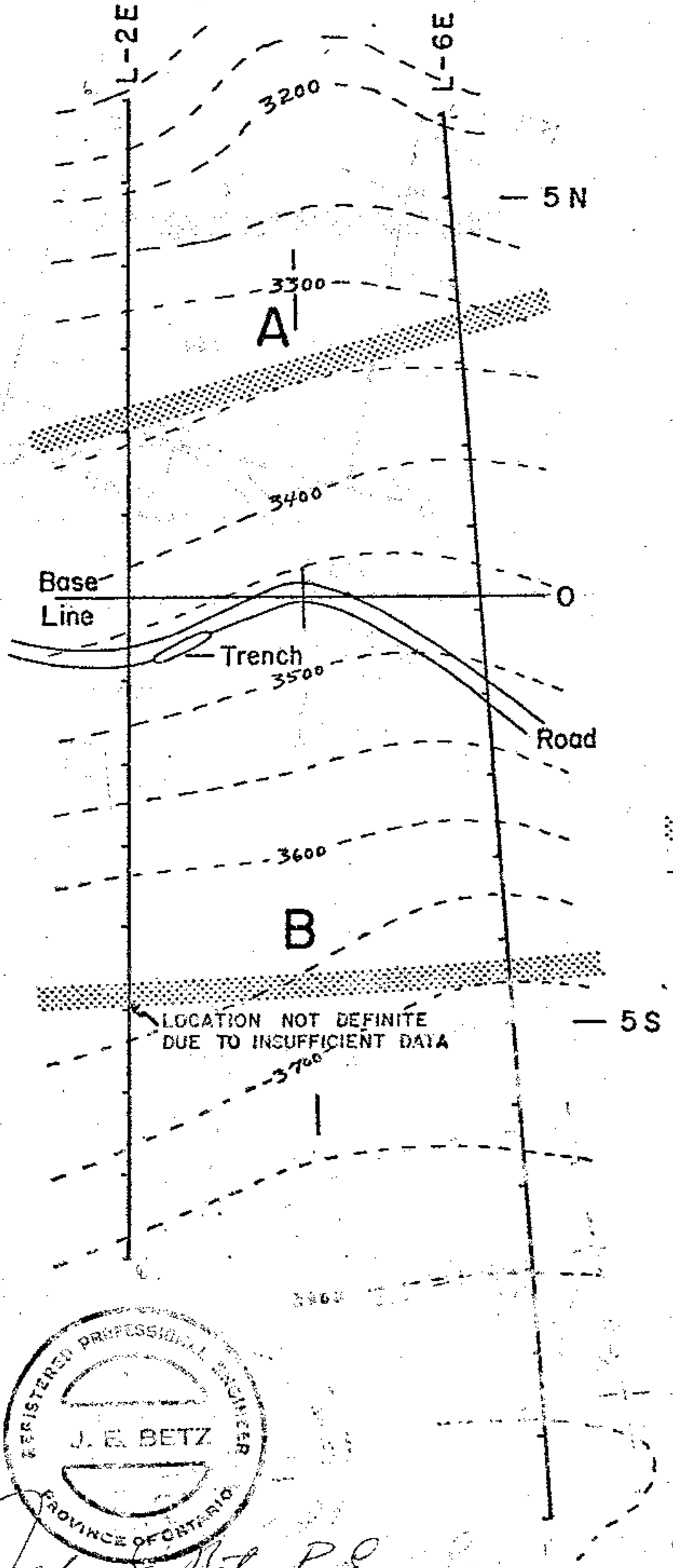
REGISTERED PROFESSIONAL ENGINEER
J. E. BETZ
PROVINCE OF ONTARIO

John E. Betz, P. Eng.

200 0 200 400 FEET
50 0 50 100 METERS

JOHN BETZ LTD.

TO ACCOMPANY REPORT OF AUGUST, 1976



6113

LEGEND

Very poorly conductive zone

---- 3000 Topo contour - interval 50 ft. (15·25m)

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6113
MAP NO. 38

Topo contours & Interp. Cond zones

NORCEN ENERGY RESOURCES LTD.

TAM CLAIM GROUP
MAIN SHOWING GRID

CHILLIWACK AREA
NEW WESTMINSTER MINING DIVISION, B.C.

200 0 200 400 FEET
50 0 50 100 METERS

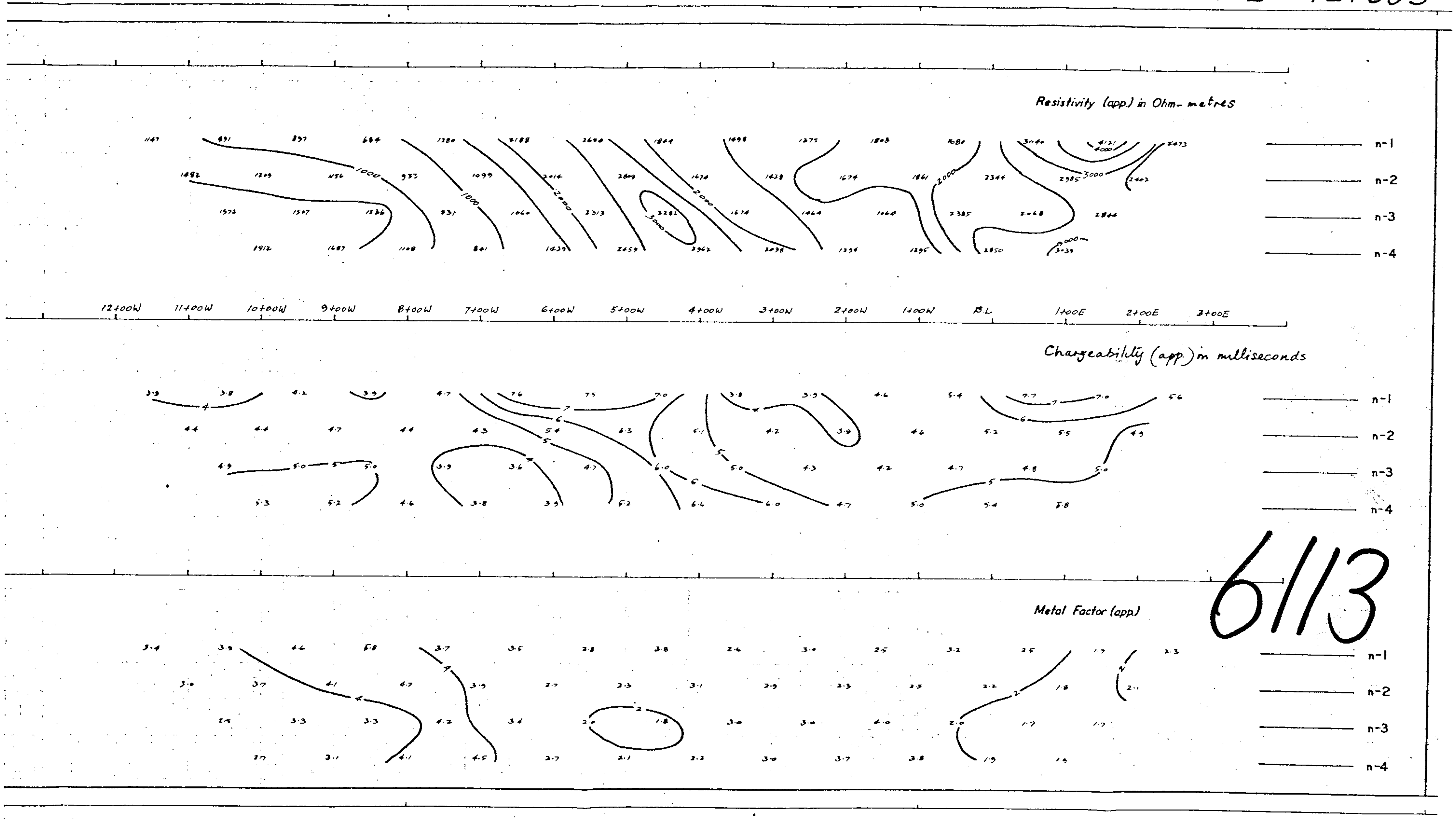
REGISTERED PROFESSIONAL ENGINEER
J. E. BETZ
PROVINCE OF ONTARIO

John E. Betz, P. Eng.

JOHN BETZ LTD.

TO ACCOMPANY REPORT OF AUGUST, 1976

LINE: 42+00S


Resistivity (app.) in Ohm-metres
12+00W
11+00W
10+00W
9+00W
8+00W
7+00W
6+00W
5+00W
4+00W
3+00W
2+00W
1+00W
B.L.
1+00E
2+00E
3+00E
Chargeability (app.) in milliseconds
Metal Factor (app.)
n-1
n-2
n-3
n-4
6113